PULP & PAPER

January 1982

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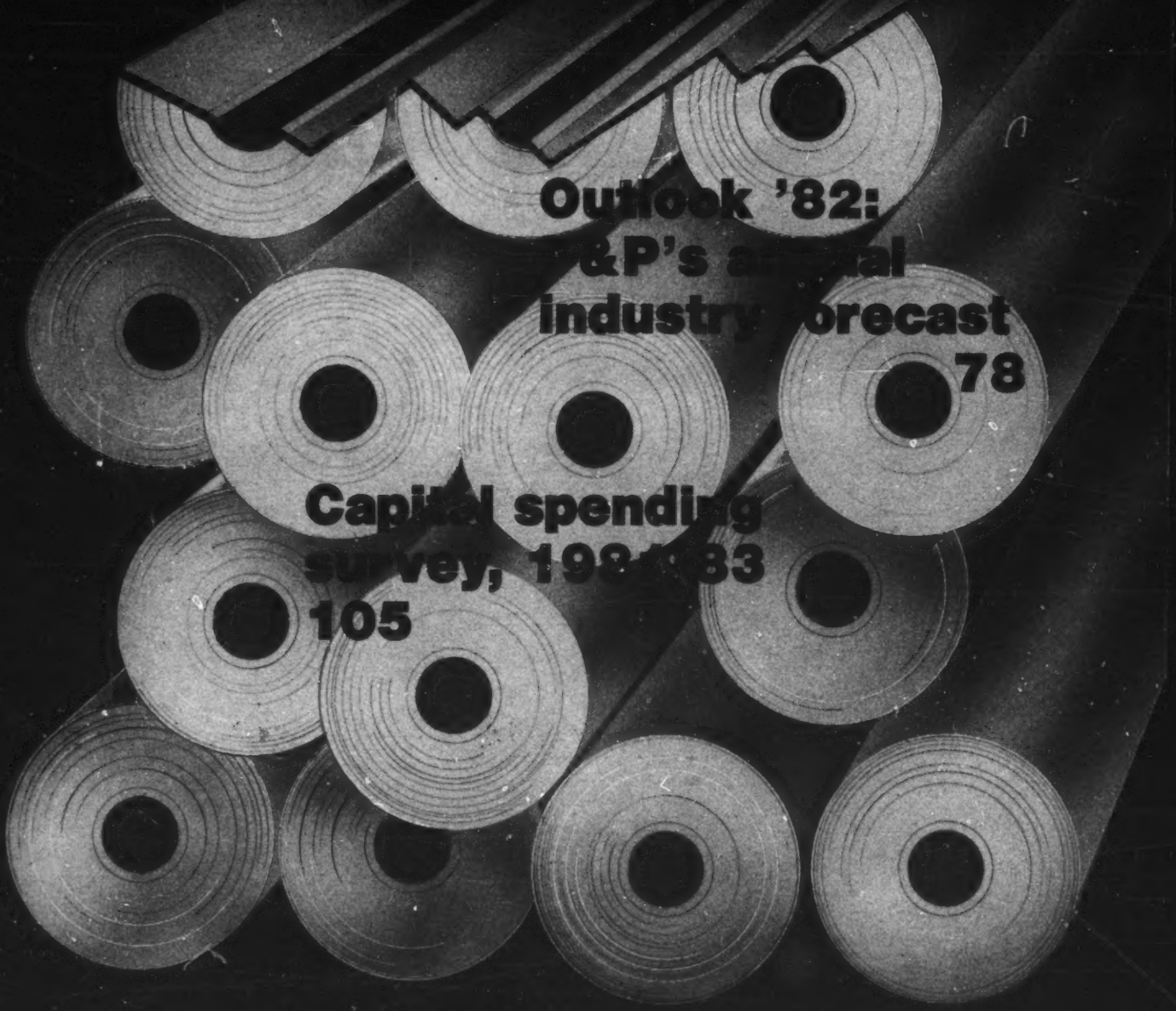
OUTLOOK 82



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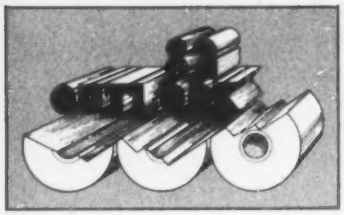

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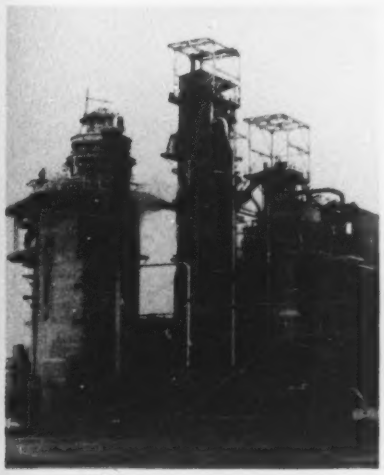
CAPITAL SPENDING



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Cover: North American pulp and paper industry faces a downturn in first quarter 1982, but gradually increasing operating rates are expected to bring an end to current recession by mid-year. (Cover art by Rik Olson)

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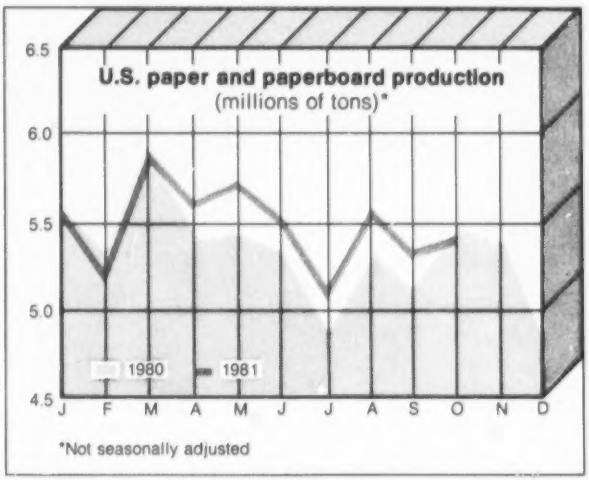
U.S. paper and paperboard production in October came to 5.4 million tons, 2.1% below October 1980 levels, and bringing the seasonally adjusted annual rate for the year-to-date output to 64.2 million short tpy, 2.9% above the comparable 1980 rate, according to the American Paper Institute. Data on the early weeks of November production point to further declines, particularly in paperboard, API noted. October paper production was also about 4% above the rate of shipments, API said, indicating some inventory building at paper mills.

Among major grades, newsprint continued to show the greatest strength, with October production up a hefty 11.3% over year-earlier figures, and annualized year-to-date up 12.4%. Production of uncoated papers and unbleached kraft packaging was below year-ago levels, while coated papers held even. Paperboard production in October was below 1980 levels in all major grades, bringing total paperboard output 2.0% below 1980.

Total Canadian newsprint shipments in October reached 795,000 metric tons, up 8.1% over year-earlier levels, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates were 97% vs 94% in October 1980.



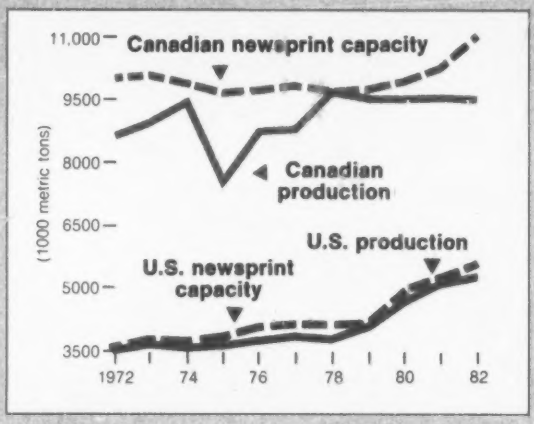
		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	October	463	11.3	5,267	12.4
Uncoated groundwood (s)	October	127	−2.3	1,447	−3.9
Coated paper (s)	October	424	0.2	4,977	7.1
Uncoated free sheet (s)	October	644	−7.6	7,970	−1.0
Unbleached kraft packaging and industrial (s)	October	307	−8.9	3,926	−1.2
Tissue	October	380	2.4	4,498	2.4
Total paper	**October**	**2,621**	**−0.8**	**31,297**	**3.2**
Kraft linerboard, unbleached	October	1,213	−1.1	14,966	3.9
Semichemical medium	October	395	−5.3	4,823	1.5
Bleached paperboard	October	324	−0.3	4,015	3.1
Recycled paperboard	October	602	−5.6	7,266	2.4
Total paperboard	**October**	**2,629**	**−2.0**	**32,186**	**3.0**
Total paper and paperboard*	**October**	**5,444**	**−2.1**	**65,795**	**2.5**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	September	4,522	3.5	52,596	3.4
Market pulp production	September	481	−4.2	6,231	−4.8
Wastepaper consumption at paper/board mills	September	1,209	0.8	14,776	4.4
Pulpwood consumption (cords)	October	6,645	0.7	80,572	−0.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	October	21.867	−5.1	209.013†	2.7
Containerboard inventories at box plants	Oct. 1	2,446	16.5		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	September	618	−11.7	8,240	−7.9
Imports of Canadian newsprint	September	513	−7.4	6,819†	−5.3
U.S. paper exports (including products)	September	360	−30.5	4,828	−5.1
Exports of unbleached kraft linerboard	October	130	−24.9	1,869	−23.7
Exports of woodpulp	September	347	10.9	3,762	−2.6
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	October	795	8.1	7,344†	2.1
Operating rates	October	97%	94%	94%	95%
Inventories held by U.S. consumers	Oct. 31	1,492	26.3		
Woodpulp shipments (export only)	October	563	−1.6	5,529†	−8.2
Operating rates	October	95%	95%	87%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Newsprint: Recession and new capacity hurt operating rates

Statistics:	**1980**	**1981**	**1982e**
UNITED STATES			
Production, 000 short tons	4672	5065	5300
Capacity, 000 tons	4826	5334	5640
Utilization rate, %	97	95	94
Apparent U.S. consumption			
000 tons	11,120	11,175	11,345
lb/capita	97.7	97.2	97.8
000 tons/$ billion real GNP	7.50	7.41	7.52
CANADA			
Production, 000 short tons	9507	9650	9550
Capacity, 000 tons	10,064	10,411	11,100
Utilization rate, %	94	93	86

e = Estimate



Estimated annual capacities of top companies are:

Annual capacity (000 short tons)

	Canada	**U.S.**	**Total**	**Capacity share (%)**
1. Abitibi-Price Inc.	1811	150	1961	12.5
2. Bowater Inc.[1]	557	866	1427	9.1
3. MacMillan Bloedel	1210	—	1210	7.7
4. CIP Inc.	1150	—	1150	7.3
5. Consolidated-Bathurst	1032	—	1032	6.6
6. St. Regis Paper[2]	—	850	850	5.4
7. Boise Cascade Corp.[3]	230	523	753	4.8
8. Ontario Paper	700	—	700	4.4
9. Kimberly-Clark[4]	171	420	591	3.8
10. Garden State Paper[5]	—	487	487	3.1
11. Kruger Inc.	486	—	486	3.1
12. Crown Zellerbach	265	172	437	2.8
13. Great Lakes Forest Products	430	—	430	2.7

1. Includes 215,000 tons from Catawba Newsprint Co., which is 51% owned.
2. Southland Div.
3. Includes 350,000 tons of capacity at Boise Southern Co., DeRidder, La.
4. Includes production at Spruce Falls Power & Paper Co., which is 50.5% owned.
5. Includes 47,000 tpy, its prorated share of Southeast Paper, which is one-third owned by Garden State.

North American capacity (1981): **15.745 million tons**
Capacity share of top five companies: 43.1%
Capacity share of top ten companies: 64.6%

Grade structure: The standard basis weight for newsprint is now 30 lb/3000 ft², down from the 32-lb paper that was common before 1974. Small amounts of newsprint as light as 28.5 lb or less are made. While letterpress printing continues to predominate among large U.S. newspapers, a pronounced shift toward offset has begun, and offset accounts for more than 25% of all U.S. consumption. Newspapers consume most newsprint, with small amounts going into advertising supplements, government publications, comic books, and commercial printing.

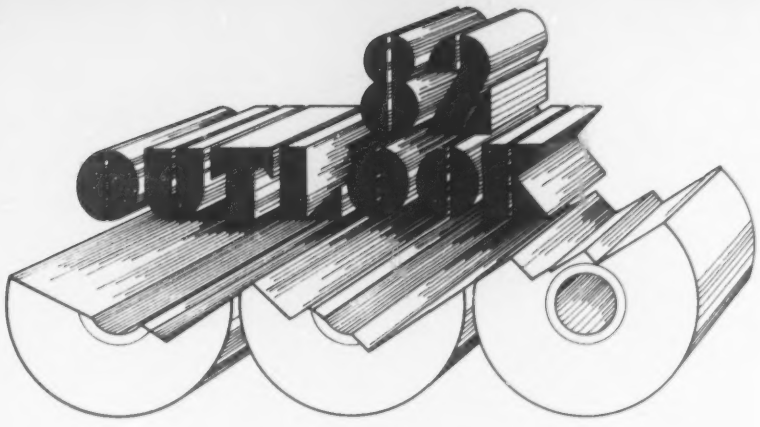
Production/capacity: Significant capacity additions in the U.S., combined with relatively flat demand, kept U.S. mills running at a slightly higher rate than Canadian mills, while British Columbia mills were shut down for seven weeks by a strike. But the strike ended with inventories high—total consumer stocks in the U.S., at 1.6 million tons in September, were up 21% from a year earlier—and publishers, faced with falling advertising revenues, were cutting orders in late 1981.

Two new 210,000-tpy machines came on-line in 1981, brought on by North Pacific Paper and Publishers Paper, along with a 140,000-tpy St. Regis Paper machine conversion. U.S. capacity additions were absorbed by displacing Canadian tonnage, and Canada was forced to sell more abroad to keep its operating rate up. At the same time, Abitibi-Price and MacMillan Bloedel were bringing new 175,000-tpy machines on-line in Canada.

Outlook: Consumption was virtually flat in most areas of the U.S. in 1981 and was expected to remain so for the first half of 1982, with the exception of modest inventory building before mill labor talks scheduled for the spring. Three new Canadian machines, averaging 190,000 tpy each, plus other expansions, are scheduled for 1982; and this, along with still uncomfortably high interest rates and price-hike announcements, is expected to keep stock accumulation to a minimum. Consumption should strengthen in the second half, but further capacity additions will probably keep operating rates depressed. With the U.S. GNP expected to remain unchanged in real terms in 1982, and newsprint consumption not likely to rise by more than 1.5%, North American operating rates will be lower than in recent years—several points below, in Canada's case.

Pricing: Prices rose $27/short ton to $453 during the summer of 1981, and a further $23 increase was announced for the spring of 1982, against some consumer resistance. Price history is as follows (U.S. East contract): 1970, $152; 1971, $158; 1972, $165; 1973, $170; 1974, $235 (30-lb), $220 (32-lb); 1975, $260 (30-lb); 1976, $285; 1977, $305; 1978, $345; 1979, $375; 1980, $426; 1981, $453.

Markets: U.S. newspapers bought 60.6% of their newsprint from Canada in 1980, down from 63% in 1979 and 66% in 1978. Expanding U.S. capacity is expected to continue this trend.



U.S. paper industry should climb out of recession in second half

Industry facing tough first quarter but production expected to improve in second half; prices may not keep up with costs, resulting in margin squeeze

SPECIAL PULP & PAPER REPORT

□ As the U.S. paper industry slid into recession in the fourth quarter of 1981, the big question was: how long and how deep will the downturn be? The recession was the second to beset the paper industry in two years, and it came at a time when the wood products side of the forest industry was still mired in the worst depression in housing since World War II.

Adding to the uncertainty was the fact Washington was not responding to the downturn in the traditional manner. The Reagan Administration was not stepping up spending to create new jobs or pumping in money to rescue ailing industries, for example. And while the Federal Reserve Board late last fall was easing the reins on money supply growth, causing interest rates to tumble, its policy was still tight compared to past recessions.

Also worrisome were the large budget deficits forecast under the Reagan program, which—unless reduced by additional budget cuts or new taxes—could lead to a resurgence in inflation and interest rates this year, according to some economists.

Outlook '82 was prepared by P&P's news staff consisting of Will Mies, Dave Allan, Paula Irons, Debra Adams and Marty Free.

Nevertheless, most industry executives were still supporting the thrust of the Administration's program. "Controlling government spending and providing incentives for job-creating investments are important steps in the right direction for economic improvement," commented Dr. Edwin A. Gee, chairman of International Paper Co. "Unfortunately, the program may not reduce interest rates and inflation to the levels the Administration has been predicting. When fully implemented, however, the program should result in a stronger economy and improved business oppportunities."

Economy pickup expected toward mid-year

After surging in the first quarter and then teetertottering the next two quarters, the economy dropped sharply in the final period of 1981, with most estimates of the decline in real GNP ranging from 4% to 6%. Most forecasters are predicting the first quarter of 1982 will also show negative economic growth, with a recovery beginning in either the second or third quarters.

On the optimistic side, Norma Pace, senior vice president, American Paper Institute, expects real GNP growth for all of 1982 to be 2.5%, and maybe as high as 3%. She blames last fall's weakness in retail sales on a high savings rate by individuals and expects "a consumer-led recovery" to begin in the second quarter of 1982.

Gee believes the economic upswing "will not have the strength of some past recoveries and will be felt primarily in the second half of the year." He looks for 2% real GNP growth, while St. Regis Paper Co.'s planning dept. expects 1.2% growth.

Among the seven leading security analysts polled by P&P, estimates for real GNP growth range from −0.6%

projected by George B. Adler of Smith Barney, Harris Upham & Co. to +2.5% expected by Mark Rogers of L.F. Rothschild, Unterberg, Towbin—with the average of all their forecasts coming in at +0.4% (see table page 81).

Capacity may outpace production growth

U.S. paper/board production held fairly steady through the first three quarters of 1981, then began to drop in October and November. For all of last year, however, production will probably be up around 1.8% to a record level near 65 million tons, exceeding the 1979 peak of 64.6 million tons.

Production is expected to remain weak in the first quarter of this year and then begin to show some improvement in the second or third quarters. Pace expects production to about match her 2.5% to 3% projection for real economic growth. Among major grades, she says that linerboard output could be up 3.5%, while printing/writing paper could advance 2% to 2.5%.

"Although forecasting a relatively slow recovery for the industry in 1982," Gee expects "some modest improvements in the operating rates of our plants and mills, and in the current highly unsatisfactory relationship between costs and prices."

Nevertheless, he is more optimistic than most analysts, whose estimates of paper and board production next year range from a 1.8% decline predicted by Gary Palmero of Oppenheimer & Co. to a 2.5% gain projected by Rogers, with a concensus forecast of a 0.3% rise.

With industry capacity expected to grow about 3% this year after a 2.5% increase in 1981, such forecasts indicate lower operating rates. Thomas P. Clephane of Morgan Stanley & Co. looks for "a third consecutive year of sluggish operations," with operating rates coming down from 93.6% in 1979 to 90.0% in 1980 to 89.4% in 1981 and 87.6% estimated for 1982. "The 87.6% figure would be the second-lowest recorded operating rate since 1962, and would be substantially less than the 92% to 93% level that the industry has historically needed to keep prices in line with rising costs."

Palmero expects operating rates to decline to 86% to 88% during the downswing, which he expects to last from October 1981 through March 1982. At that level, he says it "will be extraordinarily difficult to pass along price increases to maintain profit margins. In fact, there is a reasonable risk that well-established price levels might give way across the board."

In the second half of 1981, there was already some resistance to new price increases, while discounting was noticeable in hardwood pulp, uncoated white papers and export linerboard. For all of last year, paper industry prices were up on the average about 8% to 9%, and the consensus estimate by analysts for this year is around a 7% rise.

Among individual grades, Evadna S. Lynn of Merrill Lynch, Pierce, Fenner & Smith expects the operating rate for uncoated free sheet papers to drop from 91.7% last year to 90.7% this year, "precluding an across-the-board price increase in that general category until the fall of 1982." She doubts the newsprint price increase for March 1 "will hold unless there is a prolonged strike in eastern Canada next spring." The recent weakening in the economy "postpones the previously expected tightness in linerboard operating rates until mid-1983, thereby eroding prospects during 1982 for price increases in excess of cost increases."

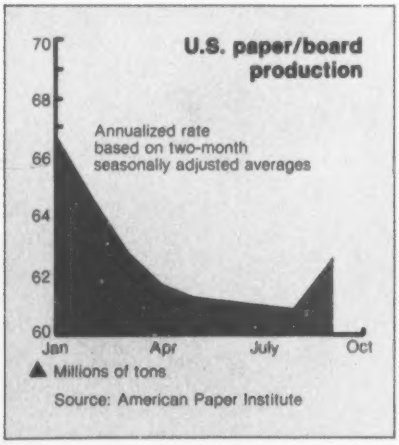
Pressure on profit margins

Analysts expect production costs per unit to decelerate from around a 9% increase in 1981 to about 8% this year, but this would still be higher than the expected increase in paper prices, resulting in some pressure on profit margins.

Rogers, for example, expects fiber costs (which represent 30% of total industry costs) to rise about 8% this year "because the relatively low level of projected housing starts should take significant pressure off all timber markets this year." He also expects labor costs (25% of

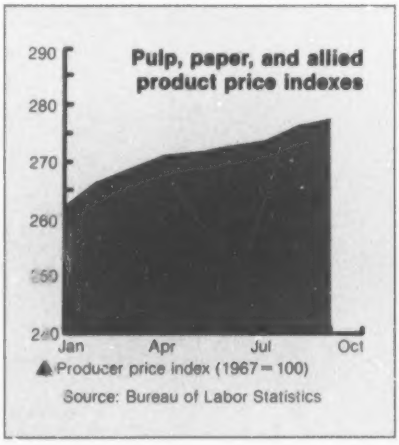
HOW U.S. PAPER INDUSTRY PERFORMED IN 1981

Production held steady through most of the year . . .



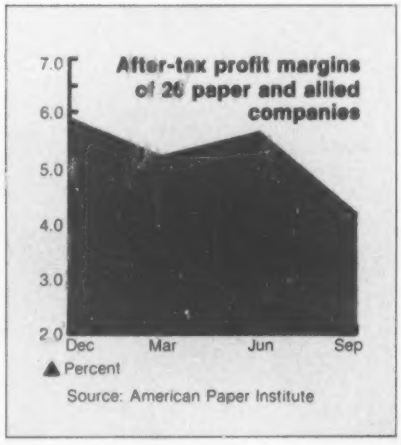
Source: American Paper Institute

. . . prices lost momentum in the second half. . .



Source: Bureau of Labor Statistics

. . . profit margins showed pressure in third quarter



Source: American Paper Institute

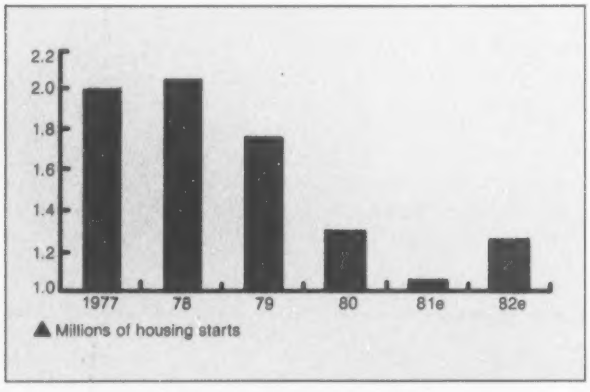
total) to increase 8%, and energy (20%), chemicals (5%) and freight (10%) to all rise about 10%—although the rise for the last two may be less.

As a result of this margin squeeze, analysts on the average expect paper industry operating profits (excluding extraordinary and nonrecurring items) to decline 2% this year. Individual estimates for 1982, however, vary from −15% projected by Palmero and −10% to −15% estimated by Lawrence Ross of Paine Webber Mitchell Hutchins Inc. to a +18% forecast by Rogers.

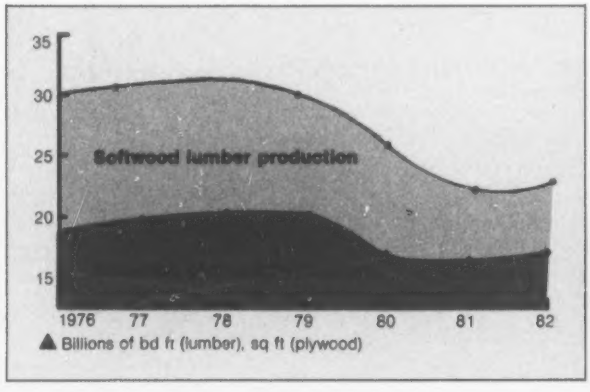
Adler, however, expects the performance of some paper companies "to diverge substantially from the 1982 trend." Among companies that will perform better this year are those with major capacity additions reaching full production and companies that have completed major energy-cost reduction projects. Some companies also stand to benefit from new expansion programs just beginning, on which investment tax credits will rise and on which more prestartup interest costs can be capitalized under new accounting rules, according to Adler and other analysts.

THE DISASTER IN HOUSING

Housing starts have been in free-fall for three years . . .



. . . and not much improvement is seen for wood products in 1982



Source: National Forest Products Assn. estimates

Disaster in wood products

"Although economic projects in early 1981 had assumed interest rates would decline and housing industry recovery would begin in the third quarter, the opposite conditions actually prevailed," George H. Weyerhaeuser, president and CEO of Weyerhaeuser Co. said recently. "Housing starts fell to one of the lowest annualized rates since World War II, in the face of 18% mortgage rates."

He estimated U.S. softwood lumber production in 1981 will total 24.5 billion ft², "the lowest level the industry has seen since the 21.1 billion of 1945, with plywood production also at extraordinarily low levels." At the beginning of the fourth quarter, an estimated 42% of the inland U.S. lumber industry was idle, 29% of the West Coast, 31% of the South and 25% of the British Columbia industry. In addition, an estimated 35% of western and 17% of southern plywood capacity was down.

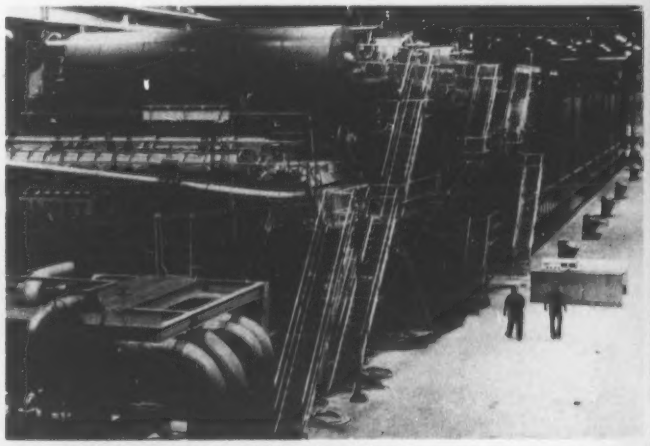
"Prices of many building materials dropped to new lows" last fall, noted W.A. Franke, president and CEO of Southwest Forest Industries, who doesn't see major improvement "until mortgage rates move below 14%."

Most analysts are projecting housing starts of around 1.3 million this year compared to 1.1 million last year. National Forest Products Assn., which sees "no solid evidence to suggest interest rates will come into the range where mortgage lending becomes attractive and borrowing becomes affordable," is forecasting 1.25 million housing starts in 1982. It projects U.S. softwood lumber production will rise only 4.4% this year, while softwood plywood production will increase 7.3%.

On the average, analysts estimate forest products earnings will rise 64% this year. Individual projections range from +12% to over +200%, with the variation partly due to whether estimates include some income from paper operations. The increase is from a depressed base, after a 30% to 40% drop in 1981 earnings and a substantial decline in 1980.

Capital spending shows resilience

The depressed cash flow from wood operations has caused some forest products companies to defer or stretch out their pulp and paper capital spending programs. Based on an analysis of some leading companies' spending plans for next year, Bruce Kirk of Goldman Sachs estimates that while forest products producers' to-



"The Chief" started up at Mead, Chillicothe, Ohio, last year.

tal spending budgets will be down 26% this year, paper companies' outlays will rise 5%. "For the first time since at least 1968, the paper/paperboard companies' expenditures will top the wood product companies' that, historically, have redeployed their inflating western timber profits into paper/paperboard plant."

PULP & PAPER estimates U.S. paper industry capital spending will fall slightly this year to $6.50 billion from $6.54 billion Commerce Dept. estimated for 1981. McGraw-Hill's latest survey found paper companies will raise outlays from an estimated $6.61 billion in 1981 to $6.86 billion in 1982 and $7.88 billion in 1983 (+14.8%).

Longer-run outlook bright

If economic growth returns to anywhere near normal levels, the longer-run outlook for the paper industry looks bright. Data Resources Inc., for example, projects that following a 0.5% decline this year, real GNP will grow 4.4% in 1983 and 4.2% in 1984. With paper/board production following this economic trend and industry capacity growth slowing to perhaps 2% or less in 1983-84 due to project deferrals, operating rates and profit margins should show substantial improvement next year.

Paper/paperboard exports were down around 10% last year from 1980's record level of 4.5 million tons, and will probably show only moderate improvement in 1982. European Community has been projecting only 1% to 2% real economic growth this year, but with the recession in the U.S., this estimate may now be high. Japan is expected to show only 4.0% growth for its fiscal year ended March 31, but may show somewhat better performance in its next fiscal year. Longer-run, however, U.S. export shipments of paper and paperboard should grow twice as fast as domestic demand, reflecting low cost position of U.S. mills and capacity curtailments overseas.

The wood products side of the industry is also expected to show longer-term improvement, with DRI projecting housing starts of 1.3 million in 1982, 1.7 million in 1983, and 1.8 million in 1984.

UNCOATED FREE SHEET

Turnaround at last

Soft uncoated free sheet markets will begin to firm up in the second and third quarters of 1982 after a year in which demand got increasingly soggy and price discounting became widespread, analysts believe. And industry executives point to forms bond and xerographic papers as among the market sectors likely to lead to strong uncoated free sheet growth in the next few years.

Actual operating rates of uncoated free sheet mills in most of 1981 were not disastrous. Mills ran at 92.1% in January and were still operating at 90.9% in August, executives estimate, with production only off by 0.9% for the first eight months of the year. But some weaknesses were showing up even then: bond and writing shipments through August had slipped 2.9% from a year earlier, while offset paper in rolls was down 1.7% and envelope stock 2.0%, one executive noted. About the only bright spot he could find was a 4.2% increase in forms bond.

Looked at by end-use, he added, there were indications of where weakness in free sheet was coming from. Paper for reprographics had dipped 7.5% and free sheet shipments to book publishers were 5.1% lower than a year earlier.

Executives don't expect all of those soft spots to disappear in the next year. Overall uncoated free sheet production will rise only 2% in 1982, bringing an operating rate that is largely unchanged at 91% or 92%, according to Mead Paper market research manager R.L. Ordeman. Champion International Corp. vice president Bartley Reitz thinks the operating rate could get as low as 87% in the first quarter before improving with the U.S. economy to 94% by year-end; he still only expects a 1.5% increase in uncoated free sheet production for the year.

L.F. Rothschild, Unterberg, Towbin analyst Mark Rogers, who sees a 93.6% operating rate this year, thinks production in the first quarter will edge down 1.1% from

WHAT ANALYSTS ARE PROJECTING FOR 1982

Percentage change from 1981 levels

	Growth in real GNP	Paper/board[1] production	Operating rates[2] Paper	Operating rates[2] Paperboard	Paper/paperboard prices	Costs per unit output	Operating profits[3] Paper firms	Operating profits[3] Forest Prod.
George B. Adler Smith Barney	−0.6%	−1.3%	88.0%	87.5%	+7.0%	+8.0%	−10.0%	+40.0%
Thomas P. Clephane Morgan Stanley	+0.7	+1.0	89.5	89.0	+5.0	+6.3	−6.0	+12.0
Bruce Kirk Goldman Sachs	−0.4	−0.3/ −0.5	87.0/ 88.0	87.0/ 88.0	+8.0/ +9.0	+8.5/ +9.5	+6.0	+10.0/ +12.0
Evadna S. Lynn Merrill Lynch	0.0	+0.5	89.7	88.0	+7.1	+7.9	+5.7	+219.0
Gary Palmero Oppenheimer	0.0/ +0.5	−1.8	90.0	88.5	+5.8	+7.2	−15.0	+25.0/ +35.0
Mark Rogers L.F. Rothschild	+2.5	+2.5	91.7	91.4	+9.8	+8.2	+18.0	+45.0
Lawrence Rose Paine Webber	+0.4	+1.5	89.0	91.0	+6.0/ +8.0	+8.0/ +9.0	−10.0/ −15.0	+75.0/ +100.0
Average	+0.4	+0.3	89.3	89.0	+7.2	+7.9	−2.0	+63.6

1. Includes construction grades, in most cases. 2. Production as percent of capacity. 3. Excluding extraordinary or nonrecurring items. Most analysts include firms like International Paper, Union Camp, Westvaco, etc. in paper earnings category and companies like Weyerhaeuser, Georgia-Pacific, and Louisiana-Pacific in forest products. Merrill Lynch and Paine Webber estimates for paper exclude wood products contributions, while forest products estimates are for building materials only.

New U.S. printing/writing paper capacity through 1984

Announced projects	Location	Capacity (000 tons)	Startup
Coated groundwood (Nos. 4 and 5)			
Boise Cascade	Rumford, Maine	160	1981
Consolidated	Wisconsin Rapids, Wis.	14	1981
Nitec	Niagara Falls, N.Y.	70	1981
Mead	Escanaba, Mich.	200	1982
St. Regis	Sartell, Minn.	168	1982
Weyerhaeuser	Columbus, Miss.	175	1982
Coated free sheet (Nos. 1 to 3)			
Plainwell	Plainwell, Mich.	11	1981
Scott (S.D. Warren)	Skowhegan, Maine	200	1983
Uncoated free sheet			
Crown Zellerbach	Wauna, Ore.	30	1981
Mead	Chillicothe, Ohio	150*	1981
Willamette	Hawesville, Ky.	100	1982
Champion	Courtland, Ala.	150	1984
Crown Zellerbach	Camas, Wash.	160	1984
Union Camp	Eastover, S.C.	210	1984
Weyerhaeuser	Columbus, Miss.	200	1984

*Net improvement is 75,000 tpy

the same period of 1981. He also thinks the industry will do slightly better on pricing than it did in 1981: he forecasts an 8% improvement in prices for 1982, compared with a 7% rise in 1981.

Once the economic downturn begins to reverse, low inventories will give uncoated mills a quick boost, executives believe. Reitz pointed to both an inventory correction and an increase in copier sales as strong points for reprographic paper demand in the second half. Ordeman agreed that demand for both reprographic and bond paper has been "masked by inventory draw-down in both the end-user and distribution-channel levels." But he also noted that "the heavy increases in cut-size capacity over the past year will hold back a real strengthening in cut-size until the third quarter."

Offset and other book papers will bounce back with the economy, Reitz said, while "envelope papers will do better because of the successes in direct mail target advertising." Ordeman also sees uncoated book grades picking up "strongly with the end of the recession," but adds they will "show only modest growth over the next five years as the demand for higher quality printing results in a swing toward coated in an increasing number of jobs." Also inhibiting book paper sales over the next few years will be the "changing school enrollment," Reitz noted.

At the same time, the increasing dependence of business on instant information will be a factor in the anticipated strength in forms bond and reprographic papers in the next few years, executives believe, with Reitz noting that "the proliferation of small computers will help the forms market. Their individual paper consumption will be modest, but the number of machines will be enormous, especially as they move into small businesses and the home." Initially, however, home computers will probably use specially treated papers more than forms bond, Reitz said.

Free sheet mills will need all the help they can get going into the mid-1980s, with a significant jump in capacity likely in 1984. In that year, 720,000 tpy of capacity is scheduled to come on-line, coming after no increase in 1983 and only 100,000 tpy of new capacity in 1982.

COATED PAPER

Some downtime; demand firm

Coated paper demand will recover solidly from the 1981-82 recession if the downturn doesn't last much beyond mid-year, but the upswing will look very different to coated free sheet and coated groundwood mills. Free sheet mills will run virtually full-out during the second half, while groundwood mills will have trouble finishing the year much above an 85% operating rate, industry executives believe.

The key difference between free sheet and groundwood, observers say, is that groundwood capacity is in the middle of a dramatic surge while free sheet capacity is largely static. Indeed, free sheet manufacturers plan only one addition in the 1982-84 period, a 200,000-tpy machine Scott Paper Co.'s S.D. Warren Div. is installing at Skowhegan, Maine, in 1983. By contrast, coated groundwood capacity rose 206,000 tpy in 1981 and is going up 543,000 tpy in 1982. R.L. Ordeman, Mead Paper market research manager, predicted the coated groundwood capacity bulge will not be fully absorbed by the market until 1985.

Highlighting a picture of healthy demand and a mixed operating rate, St. Regis Paper Co. senior vice president James Bowersock forecasts some industry downtime and a coated groundwood operating rate of 84% to 85% for 1982. He also thinks coated groundwood prices will not keep pace with inflation but will "rise in the 6% to 9% area" in 1982. Ordeman believes the groundwood operating rate will be "in the high 80s"—in contrast with a coated free sheet rate of 95% to 96%.

Recovery will pull free sheet operating rates up, and "inventory corrections will speed the recovery once it starts" for both free sheet and groundwood, Champion International Corp. vice president Bartley Reitz believes, but the groundwood capacity bulge will prevent groundwood from enjoying high operating rates as a result. He expects free sheet operating rates to bottom out in the first quarter at 93% and groundwood at 88%. But from there on, the path of the two groups will diverge, he predicts: free sheet mills will be running at 98% at year-end, with flat capacity limiting shipments to a growth of only 1%, while groundwood mills will be running below the 88% of the first quarter with shipments for the year rising by 3%.

Fundamental demand for both groundwood and free sheet remains strong, most observers say. Bowersock believes rising postage costs "will cause magazine publishers to seek the less-expensive No. 5 grade, especially the lighter-basis-weight paper."

Some publishers and commercial printers were forced up to coated free sheet or over to uncoated paper in the 1970s due to a lack of available coated groundwood supply, and most executives believe that trend is reversing. Reitz feels No. 5 "has already taken back lighter-weight free sheet business lost in the 1970s," and believes the 100,000 tpy of business lost by uncoated groundwood mills to coated groundwood in 1981 will be roughly duplicated in 1982.

New potential applications will be a growth area for groundwood in the future, according to Bowersock, and Ordeman predicted that "the low end of the free sheet coated grades will feel some impact from groundwood

coated mills who can produce weights above the No. 5 publication level and at a competitive brightness with No. 4 grades."

Bowersock also indicated coated groundwood use in commercial printing will increase in the next five years, rising from a healthy 412,000 tons in 1981 to between 570,000 tpy and 620,000 tpy by 1986. Overall commercial printing activity involving all papers was up 2.6% for the first nine months of 1981, Ordeman noted, "a fairly strong showing in an uncertain economy."

Both the high (Nos. 1 and 2) and low (No. 5) grades of coated paper will continue to outperform the middle grades, most observers believe, although the "much larger capacity base of the middle grades" will allow the Nos. 3 and 4 to act as a second-choice alternative to high-grade coated for commercial printing when the higher grades are unavailable, Ordeman said.

Free sheet mills will benefit from the fact that "advertisers now know that target marketing sells high-ticket, high-quality products more effectively than any other medium," according to Reitz. Noting that "many advertisers assert catalog sales are immune to recessions, especially in the top half of the market," he predicted both catalogs and direct mail marketing uses for coated free sheet will be a growth area.

LINERBOARD

Bright prospects beyond slump

Rising inventories, temporary shutdowns and some price shaving were all indications of growing weakness in the U.S. linerboard market late in 1981. But most forecasters expect demand to pick up by the second half, and longer-run prospects remain bright due to limited capacity additions, steady domestic demand growth, and new overseas markets.

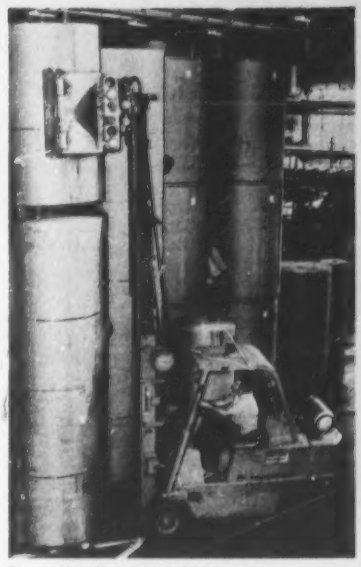
Through the first three quarters of 1981, linerboard mills ran near full capacity, with steady demand from domestic corrugated box plants offsetting growing weakness in export shipments. Unbleached kraft linerboard production through September was up 4.5%, despite a 22.4% decline production for export, according to American Paper Institute figures.

The sharp decline in exports reflected weakness in the economies of Western Europe and Japan, higher value of the U.S. dollar, and reduced level of shipments to People's Republic of China, which imported more than 300,000 tons of linerboard (including bleached) in 1980.

Still, some of the increase in total linerboard production last year reflected inventory building, with containerboard stocks at box plants and mills rising from a Feb. 1 low of 1.96 million tons to 2.45 million tons—6.7 weeks of supply—Oct. 1, according to Fibre Box Assn. data.

Growing weakness in the market was reflected in unsuccessful attempts to raise linerboard prices from the $300/ton level reached at the first of the year and by increasing reports of mills taking market-related downtime in the third quarter. "Current economic conditions have resulted in a moderate easing of demand for paperboard and corrugated containers," Roger W. Stone, president and CEO, Stone Container Corp., told shareholders.

Linerboard demand should begin to recover toward mid-1982, with S.P. Moscarello of Merrill Lynch Economics forecasting a 0.7% decline in box shipments in the first quarter, followed by increases of 3.9%, 3.0%, and 5.7% for the next three quarters. For all of 1982, Merrill Lynch forecasts a 3.0% increase in box shipments to 256.6 billion ft².



Inventories rose last year.

Norma Pace, senior vice president, American Paper Institute, expects linerboard production to show about a 3.5% gain next year, tracking the projected growth in box shipments. Mark Rogers of L.F. Rothschild, Unterberg, Towbin is less optimistic about real GNP growth, and expects linerboard production to rise only about 0.2% next year, not showing a sizable gain until the fourth quarter.

With a large slug of new capacity coming on line late in 1981, he expects operating rates to decline to 94% in 1982, compared to 97.5% in 1981. St. Regis Paper Co. planners are also projecting linerboard operating rates in the 94% to 95% range this year.

Fourth-quarter 1981 startups included International Paper Co.'s new mill at Mansfield, La., with capacity to produce 460,000 tpy of linerboard and 270,000 tpy of semichemical medium, as well as Stone Container's new 105,000-tpy liner machine at Florence, S.C.

But no other major capacity additions have been approved beyond Weyerhaeuser's new 200,000-tpy machine scheduled to start up at Valliant, Okla., this year. Approval of Georgia-Pacific's proposed new liner machine for the Crossett, Ark., or Palatka, Fla., mills, and of Champion International's new mill for Jasper, Texas, will probably be delayed because of depressed earnings. And International Paper Co. may close down or convert about 300,000 tpy of linerboard capacity at Georgetown, S.C., to bleached pulp and paper.

As a result of this slow capacity growth, the liner market should become extremely tight in 1983-84 with anything near normal growth in domestic demand, and most analysts expect linerboard prices to rise sharply. This should greatly improve the profitability of producing linerboard, which at current price levels has a gross margin of only about $30/ton vs about $140/ton for bleached kraft pulp and $100 for newsprint, W.A. Copeland, of Copeland Economics Group Inc., estimated.

With Swedish and Japanese producers concentrating on higher-value grades and the opening of a new market in China, prospects for U.S. linerboard exports are bright, but may be supply-limited. While liner exports (including bleached) will rise from 2.1 million tons (including bleached) in 1981 to 2.25 million tons this year, Rogers said "it is unlikely that 1980's record level of over 2.5 million tons will be surpassed in the forseeable future." He expects export levels after 1982 to level off, "with domestic consumption being a major beneficiary of the modest capacity expansion planned in 1983-84."

CANADIAN INDUSTRY

Canada faces market slowdown in newsprint, groundwood, pulp

Canada's paper industry has just about everything going against it that could possibly face one country in a single year: its major customer, the U.S., is in a recession; its overseas customers aren't doing any better; its competitors have installed new capacity located closer to end-users than the Canadian mills; much of its productive capacity may be closed by strikes just as any economic recovery ought to be getting under way; and it may lose some of the currency advantage which was an important source of profit last year.

By contrast, the U.S. newsprint industry should run practically full-out, and U.S. uncoated groundwood mills will maintain operating rates at least slightly higher than their Canadian counterparts. About the only area where the U.S. and Canada are in the same boat is market pulp, where everybody faces a weak market and some downtime going into 1982.

Yearly increases in the U.S. and Canadian gross national products will be modest in 1982, coming after an equally modest 1981. Forecasts range from the 2.5% U.S. GNP hike in 1982, after a 1% increase in 1981, predicted by L.F. Rothschild, Unterberg, Towbin analyst Mark Rogers, to a 2% downturn Jaak Puusepp of Pemberton Securities in Vancouver, B.C., sees for the U.S. after a 1.8% increase in 1981. And by almost anybody's yardstick, the end of 1981 and first quarter of 1982 look like a low point.

And the Canadian economy may not be in much better shape. Data Resources Inc. expects a 3.7% GNP rise in 1981 to be followed by a 2.1% increase in 1982, while some industry executives are less optimistic —H.L. Martin, British Columbia Forest Products Ltd.'s manager of newsprint sales, expects Canada's GNP to rise by only about 1% for 1982.

Other economic signs don't look any better. Martin expects Canada's consumer price index to rise by 15% in 1982 and CIP Inc.'s W.P. Woodworth thinks the U.S. CPI will top 9% for the year. Executives expect interest rates to remain near present levels, with one executive forecasting a U.S. prime rate averaging as low as 12%, but most staying closer to the 16.5% prime rate forecast by St. Regis Paper Co.'s James Bowersock.

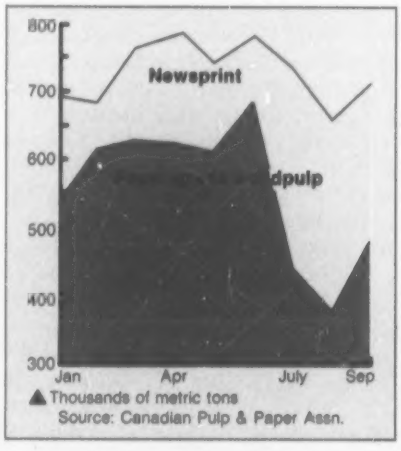
Many Canadian companies, especially in the West, saw 1981 earnings devastated by the slide in North American housing markets, and little relief is expected this year. Rogers estimated U.S. housing starts will rise to 1.2 million in 1982, up from 1.1 million, while a more optimistic Brian Topp, of Montreal-based Jones Heward & Co., still sees only a 1.4-million-start year.

All Canadian mills selling into the U.S. have benefitted from the weak Canadian dollar, but that hedge, too, may be increasingly lost in the next few years. Puusepp feels the Canadian dollar will rise from 83.3 U.S. cents in 1981 to 83.75 cents in 1982, while Topp thinks it could get up to 85 cents this year and 90 cents next year, which "will offset some gains in profitability for Canadian firms in 1983 to the extent each has not dabbled in the forward exchange market."

Ottawa could help the profit picture of Canadian industry through "policies that change exchange rate relationships and tariff provisions," Topp noted, calling both

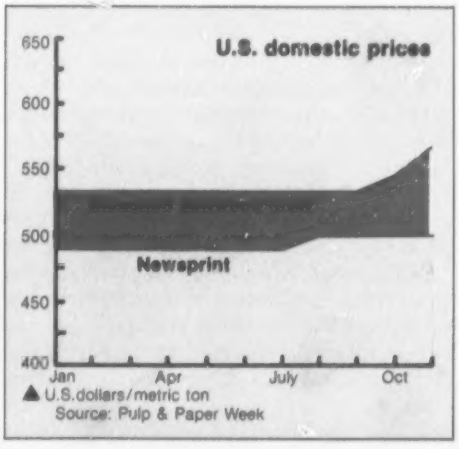
HOW CANADIAN INDUSTRY DID IN 1981

Strike, weakening economy affected shipment levels



▲ Thousands of metric tons
Source: Canadian Pulp & Paper Assn.

Newsprint prices rose mid-year, 4th-quarter pulp hike uncertain



▲ U.S. dollars/metric ton
Source: Pulp & Paper Week

factors "negatively poised" for now. He also warned that "changes in tax laws lowering the overall corporate rate but discontinuing special incentive and grant programs could be negative."

Perhaps a bigger worry for the industry than exchange rates this year will be the potentially thorny labor negotiations this spring. Union locals in eastern Canada are expected to try to duplicate the 15%/13% contract won by British Columbia workers last year, and Puusepp thinks labor settlements will add $12/ton to newsprint operating costs in 1982. BCFP's Martin expects to see a 17.5% increase in labor costs in the Canadian newsprint industry, in contrast with an 8% increase predicted for the U.S. by St. Regis' Bowersock. Bowersock thinks overall U.S. operating costs will rise by 12% to 13% this year.

Canadian newsprint industry operating costs overall will climb by 15% to 16%, according to Topp, while BCFP's Martin thinks costs could rise by 19.8%, and yet the maximum anybody expects to see in newsprint price hikes this year is $35 to $40/ton. Uncoated groundwood mills are expected to do no better than keep up with inflation, and could also do worse.

All of these factors will force Canadian paper industry profits sharply down. Puusepp foresees a 20% fall in profits this year from 1981 levels, which are already depressed in many cases, and Topp believes Eastern Canadian profits will slip by 30%—and that British Columbia profits will rise only modestly, and then only "if lumber markets improve in 1982."

NEWSPRINT

Losing share to U.S. mills

Canadian newsprint mills will be hard-pressed to approach a 90% operating rate this year, with a worldwide recession coinciding with a dramatic bulge in North American capacity. Puusepp thinks the Canadian operating rate will fall to 83.7% for the year, while BCFP and Topp agree on an 85% rate, and Abitibi-Price Sales Corp. president George Arellano expects the Canadian industry to run at 87% of capacity. Nobody predicted higher than the 90% estimated by CIP's Woodworth and St. Regis' Bowersock, and most executives expect Canadian production to fall by 1.5% to 2% from 1981, to 9.4 million tons.

In contrast, U.S. production should rise by about 2%, most said, with Bowersock forecasting a 4.3% jump, to 5.3 million tons. The U.S. industry will run at anywhere from the 93% operating rate forecast by Abitibi's Arellano to the 96.0% predicted by Rothschild's Rogers, with most grouped around Puusepp's 95%. And the reason for such a strong rate in a recession year?—U.S. capacity is rising by 340,000 tpy in 1982, a 6.5% increase, while Canada is adding 6.6%, or 690,000 tpy of capacity. And U.S. mills, closer to markets, will get a larger share of estimated U.S. consumption.

That consumption rate is not likely to grow very rapidly in this recession year, unfortunately. Rothschild's Rogers sees a 2.6% growth rate, while Abitibi's Arellano thinks it will rise only 1.5% to 11.4 million tons. Some regions of the U.S. will do better than others, with BCFP's Martin expecting a 3% growth in the southern states in contrast with 2.4% elsewhere in the U.S. Another executive forecasts a 1% to 2% growth in the Midwest, rising to 2% to 3% in the Pacific Coast, while Woodward thinks consumption in the Northeast will edge up 2% and Bowersock expects demand from the Sun Belt states to continue growing fastest. Canadian consumption should rise 3.5% according to Arellano or 4% to 5% according to BCFP's Martin.

North American newsprint balance-1982
(000 metric tons)

U.S. consumption (at 1.5% growth rate)	10,350
Less inventory reduction	−200
U.S. demand	10,150
U.S. production (at 93% capacity)	4,800
Less U.S. exports	−275
U.S. production for U.S.	4,525
Demand on Canada plus overseas	5,625
Less imports from overseas	−25
Demand on Canada from U.S.	5,600
Plus Canadian demand	+1,075
Plus Canadian exports overseas	+1,900
Canadian production (87% operating rate)	8,575

Source: Abitibi-Price

Export markets will give some help at least through the first three quarters, according to Arellano, who expects Canadian overseas shipments to jump 10%. "Mexico should remain a steady market," he said, while Bowersock also pointed to Mexico as a promising market for St. Regis and other southern U.S. producers. On the other hand, nobody predicted exports will offset lost U.S. markets, and Topp noted Scandinavians will be giving Canada "fierce" competition for the important European market. At the same time, BCFP's Martin expects new North American capacity to cut Scandinavian penetration of the U.S. market slightly to below 45,000 tons, and he feels the People's Republic of China will buy more than 80,000 tons from North America—120,000 tons below the estimate of another newsprint executive who asked not to be identified.

Canadian mills could get a little help from machines being idled or converted. Puusepp estimated 100,000 metric tons of newsprint capacity would be idled during 1982, and Arellano said that in addition to 100,000 to 150,000 tons of idled capacity, he expects to see 100,000 tons of capacity upgraded to other products. CIP's Woodworth said he doesn't think any capacity will be upgraded, while another newsprint executive went so far as to predict 1.2 million tpy of capacity being shut down or converted, in a worst-case scenario.

Part of many executives' worst-case scenarios is a prolonged strike in eastern Canada, but newsprint mills outside of eastern Canada would benefit from a strike that lasted for even as short a time as a month. Inventory levels have been sliding since the British Columbia strike and Arellano and Martin predicted that will continue in early 1982, although Martin expects to see newspapers begin stocking up once again late in the first quarter in anticipation of an eastern Canadian strike.

Pemberton's Puusepp thinks consumer stocks will end the year 100,000 metric tons above late 1981, while Arellano predicts a sharp third-quarter draw-down and a level in late 1982 that is 200,000 tons below year-earli-

Newsprint operating cost increases forecast for 1982

Item	U.S.[1]	Canada[2]
Labor	8%	17.5%
Energy	20	20
Wood/fiber	14	15
Transportation	n.a.	20.7
Chemicals	17	n.a.
Other	9.8	n.a.
	12-13%	13.8%

n.a. = not available
Source: [1]St. Regis Paper Co. [2]British Columbia Forest Products

er figures. The outcome of that disagreement will also have alot to say about what kind of price increase the industry gets this year. Jones Heward's Topp expects to see a $35/metric ton increase in the spring followed by an attempted $20 hike in the summer, but doubts the second increase will fully hold.

Canadian mills will be restrained in seeking higher prices by weak demand, some executives believe, but Puusepp thinks U.S. mills will be under no such constraints and "will attempt to become price leaders in their domestic market." He expects to see prices end the year about $535/metric ton, $35 higher than the beginning-of-the-year price, while two others expect the recently announced price of $540 hold by year's end.

UNCOATED GROUNDWOOD

Demand flat for year

Uncoated groundwood mills face demand levels that are likely to be unchanged from 1981, observers believe, with U.S. mills possibly enjoying a slight competitive advantage because of greater proximity to major markets. But both U.S. and Canadian industries will run "in the low 90s," according to CIP's Woodworth, while Rothschild's Rogers predicts an operating rate for the U.S. industry of 89.7%.

If proximity to markets is an important factor in this recession year, another executive who asked not to be identified could be right in predicting a Canadian operating rate of 90% and a U.S. industry running "full." He also sees a 3% increase in North American production, while Woodworth expects "little change" in output.

Despite the geographic advantage of U.S. mills, Canada will continue to capture market share in the U.S. due to the relatively flat capacity picture in the U.S. and the significant number of Canadian newsprint machines liable to be upgraded to groundwood specialties in the next few years.

If machines are converted, executives don't expect that to have any impact on capacity figures in 1982, although Woodworth indicated there could be conversions announced in 1982 that would take effect by 1984-85, and also pointed to Abitibi-Price's planned 1983 conversion of its Beaupré, Que., newsprint mill to groundwood. Jones Heward's Topp mentioned potential conversion of CIP mills to groundwood.

No new U.S. capacity is expected to come on-line in 1982, and the only machine even mentioned is a 155,000-tpy unit considered by ISA International for a proposed new mill in Alabama—and that machine would not start up until the late 1980s, if ever.

In the U.S., the only major capacity addition has been the 165,000-tpy machine producing supercalendered paper at Madison Paper's Madison, Maine, mill, which came on-line in late 1981. Despite the relatively flat capacity picture, however, U.S. uncoated groundwood mills were running at 93% or below in November 1981, and one executive noted that shipments year-to-date were 3.6% lower, while orders received were off 4.3% and unshipped orders had slid by 15.2%, indicating a soft market that was getting weaker. Madison's new machine did not come on at a good time from the point of view of the market as a whole, although the company was optimistic about keeping the machine busy. One observer noted the machine will displace about 15,000 tpy of paper that was being imported from Finland by mill co-owner New York Times. The only other U.S. producer of SC paper is St. Regis, which has a capacity of about 117,000 tpy.

Woodworth thinks the SC market will be "soft to medium" in 1982, and Topp predicted "supercalendered papers probably will have to await the next upcycle before being able to obtain a permanent place in paper markets in North America. Today's soft market conditions in all printing grades make supercalendered's price advantage over coated grades and its quality advantage in super news grades less distinct than will develop in a tight market as printers and publishers continue to downgrade."

Indeed, that position as a middle grade between lightweight coated papers and newsprint is a major problem for uncoated groundwood in a year when recession is combined with overcapacity in competing grades. Woodworth noted that "overcapacity in coated groundwood will enable some upgrading to occur," and Champion International Corp. vice president Bartley Reitz predicted that 100,000 tons of orders lost by uncoated groundwood mills to coated groundwood in 1981 will probably be repeated in 1982.

U.S. uncoated groundwood shipments to magazine publishers through August were up 1.4%, another executive pointed out, but shipments to catalog publishers had slipped by 5.4%, representing a loss of about 20,000 tons. At the same time, coated No. 5 shipments to catalog printers were up 20.3%, representing a gain of 35,000 tons. Uncoated groundwood shipments to commercial printers fell by 30,000 tons, or 19%, with coated No. 5 shipments edging up 4000 tons, or 1.3%.

But the news wasn't all bleak for uncoated groundwood mills, and an executive with mills in Canada predicted groundwood forms paper production will jump by 10% this year, with roto news shipments rising by 5%. Indeed, uncoated groundwood shipments to forms manufacturers by U.S. mills through August rose 21%, to an annual rate of better than 250,000 tpy, and most observers believe growth will remain in the double-digit area for two or three more years at least.

The U.S. roto market, hurt by an 8% cut in page sizes by U.S. publishers in late 1981, is still likely to grow from around 750,000 tpy in 1981 to 900,000 tpy by 1985. And with U.S. production not expected to grow by more than 70,000 tpy by 1985 from the 250,000 ton level of 1980, Canadian mills will still supply the lion's share of North American needs.

More discounts, downtime

Business was bad and getting worse for market pulp mills going into 1982, and most observers believe the situation won't begin to improve before mid-year. Until then, market pulp mills will have trouble making current list prices stick, and some will be forced to take extended downtime to avoid accumulating inventory.

With both domestic and export markets in a recession, U.S. market pulp mills will run at 89% in 1982, down from 95.2% for 1981, Pemberton Securities' Jaak Puusepp forecast, while he expects Canadian mills to run at 90.5%, down from 96%. An industry executive estimated both U.S. and Canadian mills will run at no more than 92%, with hardwood mills doing worse.

At the same time that demand for market pulp is falling, Canadian producers are adding substantially to capacity next year. Canadian market pulp capacity is scheduled to rise by 512,000 short tpy in 1982, with Quesnel River Pulp's export-oriented 175,000-tpy market TMP mill in Quesnel, B.C.—which came on-line in November 1981—the biggest single addition. Northwood Pulp & Timber's 280,000-tpy bleached softwood expansion at Prince George, B.C., is also scheduled to start up in 1982.

The same cannot be said for the U.S., however, where capacity will remain flat in 1981. In fact, only two new market pulp mills are expected to be built by 1985-86 in the U.S.: Champion International Corp.'s 260,000-tpy hardwood pulp mill at Quinnesec, Mich., and a 315,000-tpy kraft pulp mill planned by Great Northern Nekoosa and Finland's Kymi Kymmene.

In addition to new capacity in Canada, the pulp industry is hurt by the weakness of the U.S. and European economies, not expected to begin a recovery before the second quarter or even the middle of the year. Puusepp doesn't think Europe's economic recovery will get under way much before the fourth quarter of 1982, while Jones Heward's Topp thinks overall exports from North America will pick up "hopefully by 1983." Puusepp expects the U.S. GNP to slip by 2% this year, and he thinks Canadian paper-grade chemical market pulp production, at 6.75 million short tons, will be 3.8% lower than 1981. He also expects the U.S. industry to slump, producing 4.2% less at 4.67 million tons.

People's Republic of China, which some had hoped would absorb a bit of the world pulp glut in 1982, will probably not consume as much as expected, said one observer, who estimated China will buy at the same level as in previous years—about 400,000 metric tons, 300,000 of which will probably come from North America.

Perhaps the only silver lining perceived by Puusepp is an anticipated firming in Japanese demand for pulp in the first half, which will give Japanese imports a boost. But nobody thinks Japan, by itself, will support a slumping North American industry, and one analyst said the latest price increase is "tottering on the brink of complete collapse."

Discounting from the new list price of $585/metric ton for northern bleached softwood kraft pulp in northern Europe was common going into the new year, and one manufacturer, MacMillan Bloedel Ltd., postponed its fourth-quarter 1981 increase for U.S. and European customers to Dec. 1 due to customer resistance. Some mills claimed they were getting the new prices: Keith Winrow, vice president of Great Lakes Forest Products, told Canadian publications that "there is talk around here of discounting by producers, but we are not." An Abitibi-Price vice president said his company was getting its hike through, but admitted there was "concern" about whether it would hold.

Elsewhere in the market, there was more than mere concern. Discounting showed up first in the export markets, and indeed, hardwood, suffering from discounts of 10% or more currently, was discounted almost as heavily in some spot market transactions a year ago. Now buyers are commonly getting discounts for all grades of pulp, and signs of significant weakness showed up in the U.S. in October, when inventories shot up 103,000 metric tons to 378,000 tons.

Norscan inventories as a whole rose sharply in October, hitting 1.347 million tons compared to 1.171 million tons in September. U.S. paper-grade pulp mills were running at 91.9% of capacity and Canadian chemical woodpulp mills were operating at 84% during that month, with increasing incidents of downtime caused by lack of orders reported.

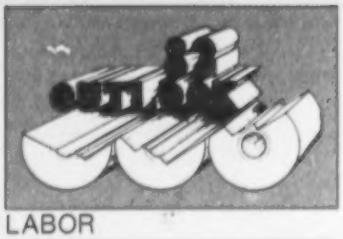
This kind of weakness in production means it will be hard for the industry to keep pace with costs this year, observers believe. Puusepp estimated the latest price increase will not be fully effective until July 1 at the earliest, while Topp said he expects it to take full effect early this year, but to be the only hike of the year.

Hampering efforts to put the increase into effect was soft paper and board production in Europe—as well as, according to PaperTree Economics president Ross Hay-Roe of Vancouver, B.C., a 25% drop in the Swedish currency against the U.S. dollar in 12 months. That virtually gave the Swedes a $700/metric ton price without officially announcing one, he explained, which allows them plenty of room for cutting production to maintain the price—or discounting to gain market share.

And yet costs will rise sharply in 1982. Topp says costs will climb by 15%, or $60/metric ton, with labor, energy, wood and chemicals all climbing at about the same rate. Puusepp forecasts a 30% increase in labor and wood costs, with freight rising 15% and energy and other factors going up 12% each, for a $44/metric ton rise. Southwest Forest Industries estimated U.S. costs will rise by 10% or more each for freight, energy and fiber; 8% or less for other materials; and 8% to 10% for labor.

In spite of higher costs, mills could find prices falling still further from beginning-of-year levels. If discounting reaches $100/metric ton, Hay-Roe indicated, it could wipe out the profits of several B.C. firms, which have already been hurt by soft lumber markets. Oversupply and discounting are expected to plague the hardwood pulp market though much of 1982, but the softwood pulp market, which was not as weak as hardwood at the end of 1982, will firm up as early as the second quarter of 1982, observers say.

Fluff and dissolving pulps were were expected to make a faster comeback in 1982 than most pulp grades. Tembec Inc. president Frank Dottori noted that the fluff pulp market, which many feel has better long-term growth potential than dissolving pulp, held relatively steady until late 1981, while dissolving pulp weakened early in the year. Through August, U.S. dissolving pulp production was down 12.6%, while Canadian output through September was off 11.2% from a year earlier.



LABOR

Labor focus is on eastern Canada

Major strikes are likely to be fewer than normal in the U.S. paper industry this year. The tempo of eastern Canadian bargaining, however, is still uncertain. Industry in both countries will be hard-pressed to be as generous with contract settlements as in previous years. Labor costs are among the expenses industry will try to hold down in an atmosphere of slowing inflation, swelling inventories, and declining demand, analysts say.

Major contracts on Canadian paper industry 1982 labor bargaining calendar

Company	Mill location	Union*	Contract expires
Abitibi-Price	Beaupré, Que.	CPU	4/30
Abitibi-Price	Iroquois Falls, Ont.	CPU	4/30
Abitibi-Price	Pine Falls, Man.	UPIU	4/30
Abitibi-Price	Sault Ste. Marie, Ont.	CPU	4/30
Abitibi-Price	Stephenville, Nfld.	CPU	4/30
Abitibi-Price	Thunder Bay, Ont.	CPU	4/30
Abitibi-Price	Thunder Bay, Ont.	CPU	4/30
Boise Cascade Canada	Kenora, Ont.	CPU, UPIU	4/30
Bowater Mersey	Liverpool, N.S.	CPU	4/30
CIP	Gatineau, Que.	CPU	4/30
CIP	Trois Rivières, Que.	CPU	4/30
Con.-Bathurst	Grand Mere, Que.	CPU	4/30
Con.-Bathurst	Shawinigan, Que.	CPU	4/30
Con.-Bathurst	Trois-Rivières, Que.	CPU	4/30
Domtar	Dolbeau, Que.	CPU	4/30
Domtar	Donnacona, Que.	CNTU	4/30
Domtar Packaging	Red Rock, Ont.	CPU	4/30
Donohue	Clermont, Que.	CNTU	4/30
Gaspesia	Chandler, Que.	CPU	4/30
Great Lakes Forest	Thunder Bay, Ont.	CPU	4/30
James Maclaren	Buckingham, Que.	CPU	4/30
Kruger	Trois-Rivières, Que.	CPU	4/30
CIP	Dalhousie, N.B.	CPU	4/30
Ontario Paper	Thorold, Ont.	CPU	4/30
Price Co.	Alma, Que.	CNTU	4/30
Price Co.	Grand Falls, Nfld.	CPU	4/30
Price Co.	Kenogami, Que.	CPU	4/30
Quebec North Shore	Baie Comeau, Que.	CPU	4/30
Reed	Quebec City, Que.	CPU	4/30
Spruce Falls	Kapuskasing, Ont.	CPU	4/30
Bowater Nfld.	Corner Brook, Nfld.	CPU	5/31
Kruger	Bromptonville, Que.	CPU	5/31
Nova Scotia Forest	Point Tupper, Nfld.	CPU	5/31
Con.-Bathurst	Ville de la Baie, Que.	CNTU	6/30
F.F. Soucy	Rivière-du-Loup, Que.	CPU	12/31
B.C.F.P.	Crofton, B.C.	CPU, PPWC	6/30
CZ Canada	Campbell River, B.C.	CPU	6/30
MacMillan Bloedel	Port Alberni, B.C.	CPU	6/30
MacMillan Bloedel	Powell River, B.C.	CPU	6/30
MacMillan Rothesay	St. John, N.B.	CPU	12/31

*CPU = Canadian Paperworkers Union; CNTU = Confederation of National Trade Unions; PPWC = Pulp, Paper & Woodworkers of Canada; UPIU = United Paperworkers International Union.
Source: Canadian Pulp & Paper Assn.

Precedents set recently by U.S. rail and auto unions may lead American unions to moderate demands. Unions in those industries opened negotiations earlier than usual and settled for pay cuts or smaller pay increases than in previous years, without strikes.

Labor in the U.S. pulp and paper industry appears to sympathize with industry troubles and is amenable to tempering its demands, but in eastern Canada, where the bargaining is concentrated this year, unions are as adamant to gain substantial wage and benefit increases as their British Columbia counterparts were in 1981. "We are brainwashed that industry is broke," said a union source. "We do not believe industry is in bad shape. It's in tremendous shape," he added.

Eager to achieve better contracts in 1982, the Canadian Paperworkers Union has already moved aggressively. Although its precise strategy will not be fully mapped out until later this month, the union last October negotiated improved pension and life insurance plans with Abitibi-Price Inc., a traditional pacesetter in bargaining. The 60,000-member CPU—the largest union to bargain in eastern Canada next year—intends to present the new plans as models in talks with other eastern Canadian mills bargaining in 1982.

Parity with West. Parity with West Coast mills will be the union's foremost priority when bargaining starts around March, a union official said. In 1981, eastern Canadian pulp and paper workers earned an average of C$10.16/hour compared with C$11.46/hour for West Coast employees. In 1982 the margin will widen, as the second year of the West Coast's 1981 two-year contract gives a 13% wage hike to an average of C$12.96/hour.

Unions are expected to use the West Coast settlement as a guide not only in gauging pay parity, but also for such issues as cost of living allowances. These were included in West Coast contracts for the first time last year. COLAs are expected to be an insignificant part of bargaining in the U.S., but in both cases, industry sources say any expectation of winning COLAs is unrealistic.

In eastern Canada, where the current wage is trailing the rate of inflation by more than 4%, unions have not had a COLA clause since the federal government ordered a wage/price freeze in 1975. In the U.S., COLA clauses have nearly disappeared and should be wiped out entirely by the end of 1982, according to American Paper Institute employee labor relations vice president Richard Klinzing. Average wage increases in the pulp and paper industry have kept ahead of inflation, and in 1980, only two COLA clauses crept into the contracts, he noted.

Major contracts on U.S. paper industry 1982 labor bargaining calendar

Company	Mill location	Union	No. of employees	Contract expires
New England Region				
St. Regis	Bucksport, Maine	U,B,A	944	4/30
Intl. Paper	Jay, Maine	U,O	1024	5/31
James River	Jay, Maine	U,O	189	5/31
Scott Paper	Winslow, Maine	U,A,B	586	5/31
Haverhill	Haverhill, Mass.	U	171	6/1
Strathmore	3 Mass. mills	U	470	6/30
Diamond	Hyde Park, Mass.	U	217	7/1
Federal Paper	Versailles, Conn.	U	182	7/10
Great Northern	E. Millinocket/ Millinocket, Maine	U,B,O U,O	2485	7/31
Fitchburg	Fitchburg, Mass	O	192	8/15
Georgia-Pacific	Woodland, Maine	U,A,B,O	560	8/31
Diamond	Old Town, Maine	U	710	9/30
Scott Paper	Skowhegan, Maine	U,A,B	260	9/30
Fraser Paper	Madawaska, Maine	U,O	1042	10/31
Eastern Region				
Westvaco	Tyrone, Pa.	U,B	245	2/17
Nitec Paper	Niagara Falls, N.Y.	O	533	3/1
Mohawk Paper	Cohoes/Waterford, N.Y.	U	201	6/6
Hammermill	Erie, Pa.	U	1344	6/10
Newton Falls	Newton Falls, N.Y.	U	441	6/15
Georgia-Pacific	Plattsburgh, N.Y.	U	555	10/1
Crown Zellerbach	S. Glens Falls, N.Y.	U	279	10/2
Southern Region				
Mead	Kingsport, Tenn.	O	877	1/24
Southwest Forest	Panama City, Fla.	U,B,A	660	2/28
Buckeye	Memphis, Ind.	O	337	3/7
Georgia-Pacific	Port Hudson, La.	U	379	6/5
Chesapeake	West Point, Va.	U	591	6/13
St. Regis	Jacksonville, Fla.	U,B,A	581	6/21
St. Regis	Pensacola, Fla.	U,B	785	6/30
Union Camp	Franklin, Va.	U,O	1213	6/30
Westvaco	N. Charleston, S.C.	U,B,A	964	6/30
Continental Forest	Hopewell, Va.	U	541	7/31
Owens-Illinois	Orange, Texas	U	337	7/31
St. Joe Paper	Port St. Joe, Fla.	U,B,A	650	8/1
Crown Zellerbach	St. Francisville, La.	U	827	8/31
Mead	Lynchburg, Va.	U	353	9/16
Intl. Paper	Vicksburg, Miss.	U,B,O	262	9/26
Mac. Bloedel	Pine Hill, Ala.	U	265	10/4
Arkansas Kraft	Morrilton, Ark.	U	292	10/14
Container Corp.	Brewton, Ala.	U,B,A,O	461	10/14
Intl. Paper	Pineville, La.	U	225	10/14
Tennessee River	Counce, Tenn.	U,B	364	10/27
Intl. Paper	Texarkana, Texas	U,B	564	11/30
Midwest Region				
Simpson Paper	Vicksburg, Mich.	O	226	1/26
Bergstrom	West Carrollton, Ohio	U	195	4/6
American Can	Ashland, Wis.	U	168	4/30
Consolidated	6 Wis. mills	U,A,B,O	2743	4/30
Mead	Menasha, Wis.	U	288	4/30
Champion	St. Paul, Minn.	U	420	5/1
Georgia-Pacific	Kalamazoo, Mich.	U	386	5/1
Nicolet Paper	De Pere, Wis.	U	329	5/31
Diamond	Middletown, Ohio	U	265	6/1
Weyerhaeuser	Rothschild, Wis.	U	577	6/1
S.D. Warren	Muskegon, Mich.	U	741	6/15
Manistique	Manistique, Mich.	U	170	6/16
Appleton	Combined Locks, Wis.	U	539	6/30
Mosinee	Mosinee, Wis.	U	465	6/30
St. Regis	Battle Creek, Mich.	O	530	6/30
Pope & Talbot	Eau Claire, Wis.	U	156	7/15
Packaging Corp.	Filer City, Mich.	O	331	7/19
Brown Co.	Kalamazoo, Mich.	U	1200	7/24
Thilmany Pulp	Kaukauna, Wis.	U	1248	7/31
Champion	Ontonagon, Mich.	U	221	8/1
P.H. Glatfelter	Neenah, Wis.	U	375	8/1
Mead Corp.	Chillicothe, Ohio	U	754	8/1
Beckett Paper	Hamilton, Ohio	U	312	9/27
Pacific Coast Region				
American Can	Halsey, Ore.	U	467	1/31
		B		2/28
Publishers	Oregon City, Ore.	W	346	3/15
Publishers	Newberg, Ore.	W	300	4/1
St. Regis	Tacoma, Wash.	U	466	5/31
Simpson Paper	Pomona, Calif.	W	398	6/1
Simpson Paper	Anderson, Calif.	U	446	6/14

* UPIU = United Paperworkers Intl. Union; A = Intl. Assn. of Machinists & Aerospace Workers; B = Intl. Brotherhood of Electrical Workers; W = Assn. of Western Pulp & Paperworkers; O = Other.

Source: American Paper Institute Employee Relations Dept.

Productivity boost. Despite a pay differential of 27% below their Canadian West Coast counterparts, U.S. pulp and paper workers began indicating their willingness to temper demands last year. Workers at several mills extended contracts for one year without a pay increase, and some settled three-year contracts averaging increases of as little as 8%. The U.S. average wage increase during the first half of 1981 was 8.9%—the first time since 1973 it has fallen below 9%, said Klinzing.

The foremost demand expected from industry's side of the table in this year's talks is a call for increased productivity. Crew and multicraft concepts are two popular means most often mentioned by industry.

Union sources, however, suspect increased productivity is really industry's means of getting unrestrained authorization to replace jobs through automation. CPU has threatened to "battle" attempts to increase productivity. United Paperworkers International Union, the largest union set to bargain next year in the U.S., also views productivity as a threat, but is willing to at least review any proposals. Some 95,000 of its members will be involved in 1982 pulp and paper industry negotiations.

Job security. Unions in both countries also see job security as an important aim in 1982 bargaining. Both will be seeking job guarantees from companies, such as giving employees prior notice of a shutdown, securing other jobs for laid-off workers, and increasing severance pay.

Unlike eastern Canada, where mills tend to follow settlements reached by Abitibi-Price, CIP Inc., or Great Lakes Forest Products Ltd., U.S. bargaining is fragmented regionally, as well as within certain companies which allow each mill to bargain separately.

Bargaining in Southeast. U.S. bargaining will focus this year in the Southeast. Although there are only 24 mills with a total of 11,870 employees set to bargain there, the companies involved are major ones, including International Paper Co., Mead Corp., MacMillan Bloedel Inc., St. Regis Paper Co., and Crown Zellerbach.

The second-most-significant bargaining region will be the Midwest, where contracts are expiring at 38 mills having a total of 123,726 employees. Bargaining in New England involves 26 mills with a total of 10,053 employees; in the Eastern region, 13 mills with 4114 employees, and on the West Coast, 8 mills with 2613 employees.

RAW MATERIALS

Pulpwood supply should be ample

U.S. pulp mills had little difficulty obtaining adequate pulpwood supplies last year as operating rates declined in the second half, sending pulpwood inventories higher. The severe downturn in housing also meant reduced competition from lumber and plywood mills for available roundwood supplies. In the West, where the lower flow of residuals from wood products plants could have been a problem, lower export demand from Japanese mills for woodchips kept the market in balance.

Through September, U.S. pulpwood consumption totaled 60.4 million cords, off 0.6% from the first nine months of 1980, according to American Pulpwood Assn. Inventories at the end of the month stood at 5.7 million cords, up from the year low of 4.9 million cords in June, but still below the 6.3-million-cord level entering 1981.

Pulpwood costs slow. Stumpage and roundwood costs in the South rose at a rate less than inflation in 1981, reversing the trend of recent years.

As of last September, pine stumpage costs were up an average of 4.8% from a year earlier, while delivered pine and hardwood roundwood costs had shown little change, according to Timber Mart-South data for 13 southern states. The depressed state of the wood products industry was probably a major factor for this decelerating trend, with more than half of all wood products mills nationwide either shut down or curtailed for parts of last year. But a reduced flow of byproduct residuals may have been responsible for a 15.1% jump in delivered pine chip costs in the South.

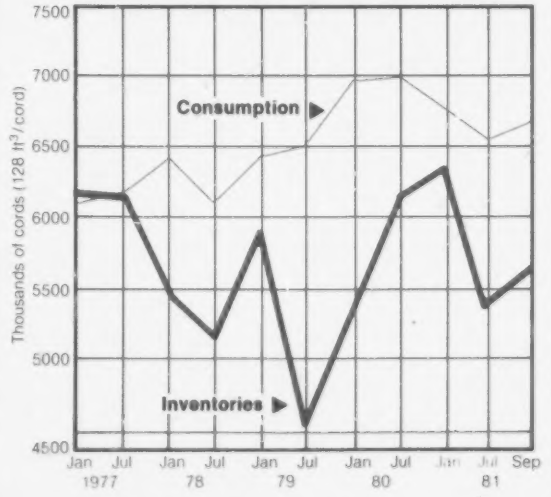
With pulp production through the first and possibly second quarters of 1982 expected to be soft, pulpwood supplies should continue to be ample. And with not much recovery seen for housing either, pulpwood costs should continue to be weak through mid-year. In addition, harvesting productivity should be boosted by wage settlements negotiated last year and by continuing woods mechanization.

West in balance. In the West, where pulp mills are more heavily dependent on residuals than any other region, a "delicate balance" existed between supply and demand in the fourth quarter, John R. Forrest, senior vice president for timber and wood products, Boise Cascade Corp., told a recent analysts meeting.

While supply of byproduct woodchips from lumber and plywood plants in the region fell sharply, export demand for chips also dropped, reflecting recession and paper mill curtailments in Japan, the largest importing country. Through August, U.S. chip exports were running at an annual rate of 4.6 million tons, down 12.6% from a year earlier, according to Commerce Dept. data.

From a peak of $131/bdu during the mid-1980 chip shortage, chip export prices to Japan ratcheted down quarter by quarter until the second half of 1981, then rose by $2.50 to $102.50/bdu—reflecting reduced chip supply due to lumber and plywood mill curtailments, not improved demand. Nevertheless, chip export prices, which were at $55/bdu in the second half of 1979, cur-

U.S. PULPWOOD INVENTORY/CONSUMPTION TRENDS, 1977-81



Source: American Pulpwood Assn.

rently remain at a historically high level, increasing cost pressures on domestic pulp mills in the region.

Although depressed housing activity may continue to restrict chip supplies in the region, West Coast pulp mills have increased their ability to generate chips from cull logs and this may help prevent another sharp runup in chip costs, according to Forrest.

Future trends. Southern pulpwood consumption is predicted to reach 64 million cords by 1984, up from 53 million cords in 1979, according to an American Pulpwood Assn. survey.

Use of residue chips from sawmill operations is forecast to reach 48% of total consumption by 1984, up from 44% in 1979 and 10% in 1959. Pulpwood roundwood requirements of 30 million cords in 1979 will increase to 33 million cords in 1984. During the period 1979-84, shortwood receipts will be relatively stable at 21 to 22 million cords, while longwood receipts will increase from 8 million to 11 million cords.

According to the survey, there has been a large increase in the number of mills in the South consuming over 800,000 cords/year. In 1977, says APA, only two mills used over a million cords, and 11 mills used over 800,000 cords. If growth projections bear out, this year there will be 10 mills using over a million cords, and 30 mills using over 800,000. And by 1984, 37 mills will be using over 800,000 cords.

Southern pulpwood trends, 1973-84

	1973	1979	1984
Chip usage	32%	44%	48%
Roundwood volume (cords)	32 million	30 million	33 million
Shortwood	—	21 million	22 million
Longwood	—	8 million	11 million
Rail/truck ratio	53% R	53% T	56% T
Whole-tree/energy chips	—	3 million	6 million

Source: American Plywood Assn.

Wastepaper market in free-fall

Weak and sometimes disastrous performances by major end-use markets sent wastepaper into a tailspin in 1981, and demand for paper stock may not improve until mid-1982, observers believe.

Prices have been in a free-fall—except for the low grades, which have already hit bottom—and some dealers worry that if the market does not stabilize before the middle of the year, even the most established dealers will be hurt—which will damage future waste supplies for the paper and board industry, mill executives fear. "There seems to be no pricing at all," said one dealer, complaining of nearly universal discounting.

Many merchants feel they can at least break even by getting rid of paperstock at low prices, said one dealer. "There's an old saying in this business," he said. "You can recover your losses on a cheap sale. But, if you can't sell, you don't have a chance."

Price slide. Some of the excess wastepaper, particularly mixed news and and old corrugated containers (OCC), is being thrown away. Dealers say that at current rock-bottom prices they are not making a profit on the lower grades, and cannot afford to keep large inventories until the price increases.

Prices on the lower grades had dropped $5 to $10/ton in most areas in November, and some was being sold lower than the list price of $25 to $35/ton for No. 1 news and $20 to $40/ton for OCC. Corrugated kraft clippings dropped from about $80/ton in the Southeast to $35 to $45/ton, and was selling in the Northeast for as little as $15/ton, according to *Pulp & Paper Week* data.

The painful slide in wastepaper prices late in 1981 contrasts with Dept. of Commerce consumption figures for wastepaper, which showed a large increase in domestic use through August (see table on next page). American Paper Institute data, which some consider more reliable, show wastepaper consumption by U.S. paper and board mills through August up 4.5% from a year ago—a gain that may be nearly erased by market conditions at the end of 1981.

Construction slowdown. Except for old news, the low grades are expected to be least in demand going into 1982 because of the severe slump in the construction industry, according Paper Stock Institute of America president William J. Flynn Jr. Through September, building paper production was down 8.3%, while insulation board was off 7.7% from the first nine months of 1980, with these grades also feeling the impact of product substitution from glass matt and plastic foam.

Recycled paperboard, largest end-use market for wastepaper, showed some improvement in 1981 over 1980, but mills were still operating in the low 80% capacity range. While increased demand from recycled newsprint producers was moving old news at a fairly steady rate late in 1981, sales were expected to decline at any time due to buyers' large inventories, said Flynn.

Hard white shavings were selling well until October, but were in "distress" by November due to tissue mills' downgrading to colored and white ledger, according to one merchant. The price had dropped $35/ton from a high of $290/ton in October to $255/ton in November, and in some cases shavings were selling for as low as $210/ton—with very little moving even at that price. The price was expected to drop $15/ton in December.

Tissue mills buying. The ledger grades were remaining in steady demand due to consumption by tissue mills, and to a lesser extent, printing and writing paper mills, running relatively well into the last quarter. But ledger prices were starting to decline $5 to $10/ton in the last quarter to $110 to $150/ton for white ledger and $90 to $125/ton for colored ledger in November, and were

expected to drop by $10/ton each by year's end.

Softness in the deinking grades is expected sometime early in 1982, however, because publishers' demand for printing was declining late in 1981, and paper mills were taking downtime, said Flynn.

Exports weaken. The only wastepaper grade that showed overall strength in the fourth quarter of 1981 was computer printout for export, but even that had begun to weaken by the end of the year. Most dealers lacked export orders for any grade of wastepaper going into December, and were uncertain when demand from overseas would resume. Nevertheless, U.S. wastepaper exports, which more than doubled in five years to a record 2.7 million tons in 1980, are expected to eventually resume their strong growth.

Through September, exports totaled 1.7 million tons, down 16.7% from their 1980 year-to-date totals. Deinking declined 37.8%, and OCC was down 15.0% from 1980 year-to-date totals, but pulp substitutes were up 5.4%, and news, 3.8%, according to Commerce Dept. figures.

Italy, largest European market for U.S. wastepaper exports, cut off orders last June, and demand from the Far East countries, which were burdened with their own oversupply of paperstock, dropped off during the last half of 1981. Mexico, which has been virtually cut off by a railroad blockade since last summer, is not expected to resume buying U.S. wastepaper for several months.

Decline in overseas shipments is attributed to worldwide economic malaise and the strengthening U.S. dollar, according to Flynn. The wastepaper market has also been hurt by price discounts in market pulp of as much as $50/ton, according to some dealers.

U.S. wastepaper statistics
(000 short tons)

	Year-to-date annualized 1981	% change from 1980	Full-year 1980	% change from 1979
Domestic use[1]* (thru Aug.)				
Mixed	2,988	−0.7%	2,686	−7.0%
News	2,390	+18.6	2,116	−0.7
Corrugated	5,705	+10.2	5,628	−1.9
Pulp substitutes	1,353	+7.6	1,301	−7.1
Deinking	1,299	+19.4	851	−0.3
Total	13,733	+9.5	12,583	−3.3
Exports[1] (thru Sept.)	2,323	−16.7	2,664	+19.3
Price index[2] (thru Sept.)	184	−14.1	209	+1.0

* American Paper Institute reported wastepaper consumption by U.S. paper/board mills as follows (000 tons): 14,810 tons through August, up 4.5% from a year earlier; 14,520 for all of 1980, down 5.5% from 1979.
Sources: 1. NARI and Dept. of Commerce
2. Bureau of Labor Statistics producer price index for all wastepaper (1967 = 100)

Six-month downturn? Dealers are calling the current wastepaper slump a "recession," and comparing it with several wastepaper downturns since the early 1950s. Each lasted about six months, according to one veteran wastepaper merchant. He expects that by March, the current downturn should begin to improve.

Most dealers are used to the ups and downs of the wastepaper market, but this downturn concerns them because of high interest rates. The cost of money has caused the entire economy to "come to a screeching halt," one noted. If interest rates do not come down to around 12% to 13%, they fear the economy may collapse and take longer than expected to get going again.

Despite the current uncertainty, however, some wastepaper dealers are optimistic about the long-term effects of the current recession. Sources of wastepaper are drying up because prices are too low to make supplying wastepaper profitable. "When the wastepaper market does start to improve," said a dealer, "it will be the best wastepaper business in the world because nobody will have any paper and it will all be at a premium."

No relief in sight for energy costs

The pulp and paper industry should expect across-the-board price increases in all energy sources in 1982, maintaining the pattern set over the past decade. The paper industry's cost of energy relative to the value of its sales has risen steadily from about 7% of the value of sales in 1972 (a pre-embargo year and one of strong economic activity) to an estimated 14.9% of the value of sales in 1981, according to American Paper Institute. The economic incentive for the paper industry to improve its energy efficiency is therefore a large one.

The paper industry has, however, changed the face of its energy consumption picture in the past ten years. The ratio of self-generated fuels to purchased energy sources has changed from a 40:60 split in 1972, with purchased energy sources bearing the burden of energy consumption, to a 52:48 split in 1981, with self-generated and waste fuels being the major fuel source (see table). In addition, while the paper industry has increased its production of paper and paperboard by 14% since 1972, it has reduced its consumption of fossil fuel and purchased energy per ton since that time by 30.1%.

The following outlook for various sources of energy—fuel oil, purchased electricity, coal, natural gas, and self-generated fuel—is based on an interview with Ronald J. Slinn, vice president-pulp, materials, and technology group, American Paper Institute.

Fuel oil. The paper industry is the largest consumer of fuel oil among U.S. manufacturing industries. World oil

prices are now controlled by OPEC, and current decontrolled domestic prices reflect international prices.

What 1982 oil prices will do is entirely dependent on OPEC, which recently agreed on a $34/bbl price for oil, in the face of a production cutback by the Saudis by about one million bbl/day. And while it is anyone's guess what OPEC will actually do in 1982, it is dealing with the world surplus of oil that has been talked about for the last year or so.

Purchased electricity. The paper industry is the third-largest consu er among U.S. manufacturing industries of purchased electricity. State utilities commissions are passing on to consumers their justifiable increases in electricity rates, but they are doing it in a way that tends to apply more of the increase to industrial consumers than to households. From that perspective, the cost of purchased electricity for the paper industry will certainly rise in 1982, and reflect the utilities' costs for oil, gas, and coal as well as for other major fuels they use.

Coal. The paper industry is also third among manufacturing industries in coal consumption. Factors which will quickly and effectively affect the price of coal are the costs of alternative fuels.

Natural gas is an important fuel to the paper industry. Although the industry is only sixth among manufacturing industries in natural gas consumption, its use of this fuel has been increasing. In 1981, paper industry use of natural gas increased 8% over 1980.

The pricing of natural gas is still regulated, and there is no prospect that natural gas will be deregulated in 1982. U.S. Secretary of Energy James B. Edwards said last November he would introduce legislation to accelerate decontrol of natural gas by perhaps 1983. But the White House has said that that is not White House policy, and the natural gas deregulation schedule will be completed by 1985.

However, the 1985 deregulation provisions allow any new gas found in deep wells to be free of price control, and there is more and more natural gas being found in this new gas category. This means that industry is, in fact, paying higher prices for natural gas, since a good deal of the newly found gas is in this category. And it appears that the price of natural gas will rise to perhaps an energy equivalent somewhere below the price of oil.

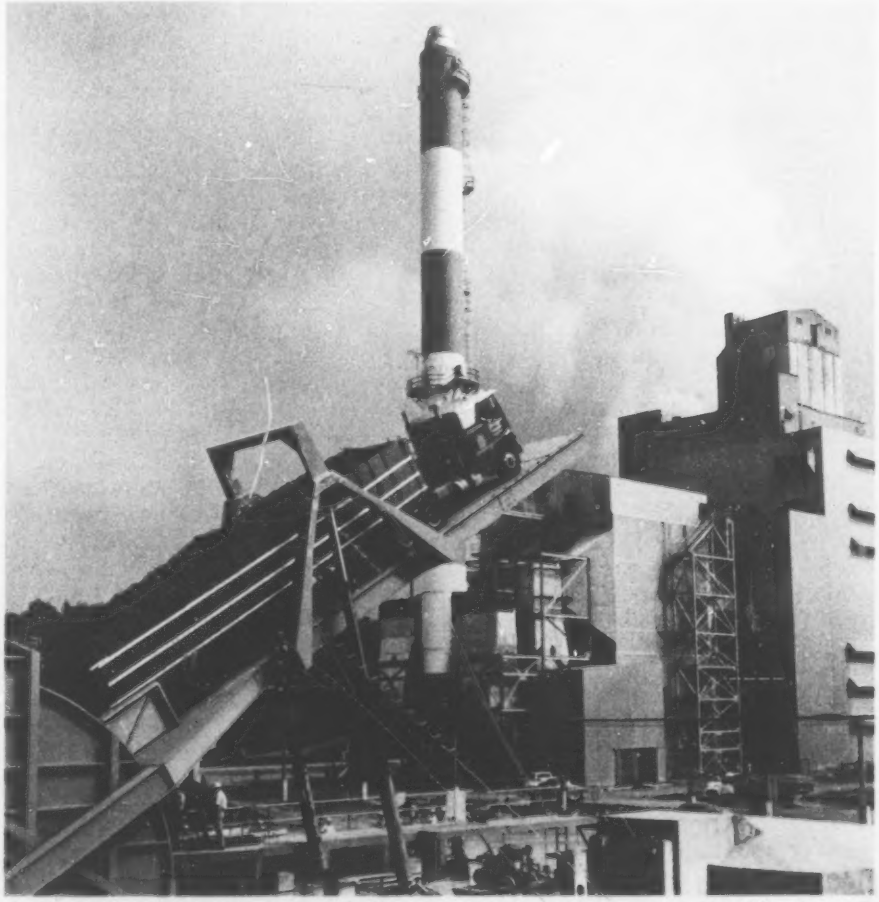
Short-term natural gas supply looks good, even if this winter is colder than usual, according to the Federal Energy Regulatory Commission. The FERC surveyed 28 major interstate gas pipelines and their wholesale customers, and sees sufficient supplies this winter without major natural gas curtailments or plant shutdowns.

Self-generated fuel. The industry relies very heavily on self-generated fuel, and is increasing that dependence each year. Orders for boilers placed by the pulp and paper industry in 1980 indicate that wood residues and spent pulping liquor will be the primary fuels for 71% of the industry's total new steam capacity.

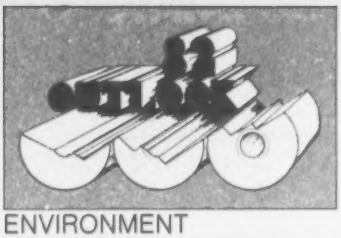
U.S. pulp, paper and paperboard industry estimated fuel and energy use, current, 1980, 1972

Source	Third-quarter 1981	1980	1972
Purchased electricity	6.8%	6.2%	4.4%
Coal	10.8	10.5	9.8
Residual fuel oil	10.6	16.0	21.3
Distillate fuel oil	0.3	0.4	1.0
Natural gas	19.5	17.7	21.5
Other purchased energy	1.0	0.2	1.1
Total purchased fossil fuel and energy	**48.0**	**51.8**	**59.1**
Woodwaste	6.7	5.4	2.0
Bark	5.3	4.8	4.6
Spent pulping liquors	39.1	37.2	33.7
Self-generated hydroelectricity	0.5	0.4	0.4
Other self-generated	0.4	0.4	0.2
Total self-generated and waste fuels	**52.0**	**48.2**	**40.9**
Total energy	**100.0**	**100.0**	**100.0**

Source: American Paper Institute



Bark/woodwaste-burning power boiler saves oil at Westvaco Corp.'s Wickliffe, Ky., mill.



ENVIRONMENT

Outlook dim for big Air Act changes

Relief for industry from the regulatory morass of the Clean Air Act probably will not emerge from Congress this year, but Capitol Hill is expected to pass one bill that will affect the cost of controlling emissions: a new law to control acid rain should get the congressional nod, over stiff industry opposition.

Also on the legislative and regulatory horizon for the paper industry are coming Clean Water Act amendments and pending regulations, along with rules dealing with hazardous wastes and Superfund, the massive waste spill cleanup program.

Paper industry lobbyists had high hopes a year ago that the beginning of 1982 would see action nearly complete on significant revisions in the Clean Air Act. Among the industry's pet projects are: revision of the controversial prevention of significant deterioration (PSD) program; abandonment of stringent lowest achievable emission rate (LAER) standards in "dirty air" areas; and elimination of federally imposed construction bans in areas that show no progress toward attaining national ambient air quality standards by mandatory deadlines.

Partisan bloodletting. What the industry is likely to get out of the current Congress, however, is far less than half a loaf. "It's just not an issue that folks up there want to get involved with, because anything they do can always be attacked as anti-environmental and anti-motherhood," one lobbyist noted.

On top of that, Senate Environment & Public Works Committee Chairman Robert T. Stafford (R-Vt.) wants to avoid the partisan bloodletting of past Air Act debates, and is on record as opposing significant changes—other than the addition of an acid rain reduction program.

Hoping to keep the Air Act debate simple, Sen. Stafford was urging Sen. George Mitchell (D-Maine), sponsor of the major acid rain bill, not to try to tack his bill on to the Air Act funding reauthorization. Sen. Stafford is a cosponsor of the Mitchell bill, however, and is expected to push for its passage once the Air Act amendments are out of the way.

As for Air Act amendments themselves, observers believe if the House, currently behind the Senate in committee action, can generate some motion, a bill will reach the President's desk by mid-year—just in time to avoid getting complicated by the 1982 congressional elections. The major question that remains is what shape such a bill will take.

Less PSD regulation. Perhaps the best chance the industry has of getting relief from Air Act regulations is in the PSD program, where the current breakdown of "clean air" areas into three classes—with specific and stringent emissions limits for each class—may be simplified in favor of one class covering national parks and similar areas and another requiring less stringent emission limits in other pristine federal lands. Under such a system, recommended by President Carter's National Commission on Air Quality, a number of paper mills would no longer be required to meet PSD emission limits; instead, they would be subject to best available control technology (BACT) or new source performance standards (NSPS), preferred by the industry.

Other possible changes include extensions of present 1987 deadlines for cities such as New York or Los Angeles that are a long way from attainment, and replacement of LAER with industry-supported BACT standards.

Acid rain bill. While the regulators are adapting to a new administration with an antiregulatory bias, Congress appears ready to hand EPA a new set of rules to enforce. Under the Mitchell bill, states would be required to take action to cut sulfur dioxide emissions by 10 million tpy in the East and Midwest by 1990, while also placing a cap on existing emissions of sulfur dioxide and nitrogen oxides. All "major stationary sources" that emit over 100 tpy of either pollutant in the 31 states in question would be subject to the cap.

Plants subject to the 10-million-tpy reduction effort would be all electric-generating power plants burning fossil fuel with more than 1% sulfur dioxide. Mitchell estimates his program would cost industry nearly $3 billion/year to implement the bill.

States that fail to issue plans to meet their quota of emissions reductions under the program would find the EPA regulating power plants in their territory. Under another bill, introduced by Sen. Christoper Dodd (D-Conn.) states could sue emitters in other states to gain relief from acid rain.

Computer modeling. That just about exhausts the list of changes expected by the paper industry out of this Congress. Despite widespread agreement that computer modeling to predict day-by-day emissions patterns simply doesn't work, Congress is unlikely to drop that requirement for PSD areas, Fielding believes. Another Washington observer added that current rules covering short-term—three-hour or 24-hour—emission overloads will not be knocked out either.

Another area where the industry has been unsuccessful in changing Congress' mind is in the near-duplication of requirements carried in the parallel NSPS and BACT standards. The paper industry wanted to get the law changed so NSPS and BACT would be equivalent—which they virtually are in practice, the industry maintains—but state governments told Congress that such rules are not equivalent in the case of all industries, and

that NSPS are not strong enough in many cases. Congress believed the states.

Perhaps the most important philosophical defeat for business in the current Air Act debate, however, came when industry proposed the introduction of cost-benefit analysis into rulemaking proceedings. Weyerhaeuser Co. senior vice president William Ruckleshaus indicated that was one change that could not be made by EPA, and would require congressional action. But opponents killed that drive by accusing proponents of "trading lives for dollars," one lobbyist noted, adding, "People up on the Hill just aren't willing to take the heat on that."

EPA regulatory agenda. Much industry attention is still focused on issues that EPA does have to resolve. Items still on the regulatory agenda include NSPS for industrial boilers, due out this spring at the earliest; and Administration review of the visibility protection program, and especially the Interior Dept.'s controversial plan to protect the "integral vistas" of 47 national parks and monuments, with the review expected to be in full swing by the beginning of 1982.

Clean Water Act debate. Debate in Congress over proposed amendments to the Clean Water Act will be far simpler, as far as the paper industry is concerned. The question of a likely postponement of the effective date for best conventional technology (BCT) requirements from the current statutory date of July 1, 1984, is one of the most important items on the industry's agenda. International Paper Co.'s Alan Lindsey noted that "with EPA not even having the numbers [effluent guidelines] out yet, it's getting to the point where it would be impossible to meet that date." Another observer said Congress may extend that deadline two or three years.

Most Water Act issues facing the industry are regulatory rather than legislative, although the overall Water Act amendment process, encompassing changes desired by many industries, could stretch out in Congress to the end of 1982. Probably the most important regulatory issue for the paper industry is the BCT numbers. A federal appellate court struck down previous guidelines in July, saving the pulp and paper industry as much as $1 billion, according to API estimates. New guidelines may be proposed by EPA as early as March 1982. NSPS guidelines for the industry are also expected in 1982.

General pretreatment guidelines are now scheduled to go into effect Jan. 31, 1982. The industry hopes to get rules changed in order to "avoid redundant treatment, to make sure that rules do not require industry to treat a waste, before it discharges into a municipal system, which the municipal system is capable of and would treat anyway," API's Mark Rey explained.

Hazardous wastes. Virtually all hazardous waste issues of concern to the paper industry are in the hands of EPA rather than Congress. Among those that may be decided this year are: definitions of hazardous wastes; whether or not EPA will suspend permitting standards for existing incinerators and surface impoundments—if standards are suspended, a regulatory impact analysis is not expected from EPA before April 1983, with a decision by the end of 1983; and whether or not EPA will develop a corrosivity test for solids, which could bring bleach plant wastes under solid waste regulation.

Also this year or in the first quarter of next year, EPA is expected to move to simplify notification standards for sudden releases of hazardous substances into the environment, while the Treasury Dept. is carrying out two studies, dealing with nonsudden releases of hazardous wastes and with the feasibility of creating a private insurance system to handle post-site-closure financial responsibility. One of the studies was due to be completed by December 1981, but results of both are expected around the end of 1982.

CAPITAL SPENDING

Survey lists 23 possible new mills, 48 new paper/board machines, 75 large expansions, and 46 U.S./Canadian companies that are spending over $100 million

By STEPHANIE POLLITZER, Consulting Editor

☐ U.S. and Canadian pulp and paper companies have announced plans to spend close to $16 billion over the next six-year 1981-86 period, according to data reported to P&P for its annual survey of capital spending projects. About 22% of this amount is designated for projects to be completed in 1984 or later. This is a higher percentage of farther-forward fiscal programming than has been reported in earlier P&P surveys. It can certainly be considered an earnest of faith in the future of North America's pulp and paper industry.

Recent economic constraints have resulted in the postponement (primarily by companies in the timber industry) of a number of expansion projects, but few projects have been cancelled outright. The tabulations in this summary do not include cost figures for these announced postponements.

In the U.S., anticipated spending of $10.328 billion is a very modest rise of 3% above that reported for the 1981 survey. Included in this figure are $7.528 billion for projects to be completed in 1981-83, and $2.8 billion for 1984-86.

Spending by U.S. mills in the year 1981, according to U.S. Dept. of Commerce figures, was expected to be $6.54 billion. P&P has estimated that 1982 spending will be $6.50 billion. Data compiled by McGraw-Hill Economics reports $6.61 billion to be spent in 1981, and $7.88 billion anticipated for 1982.

In Canada, pulp/paper industry spending plans reported in this P&P survey total C$5.566 billion, about 13% above last year's report. This includes about $814 million for projects to be completed in 1984 and later. Canadian industry spending in 1981, according to Statistics Canada, was expected to be $2.6 billion. P&P has estimated that 1982 spending will be $3.0 billion.

In view of the increased attention being paid to energy costs and operations, we are presenting this year a separate calculation of spending for power and energy-conservation projects. In the U.S., this amount ($1.8 billion) is about 17% of total expenditures; in Canada, (C$586 million) it is about 10%.

Environmental spending continues to be an important factor. In the U.S., environmental programs for the period are reported at $1.3 billion, 12% of total. In Canada, environmental programs are C$803 million, 14% of total.

Because some companies make no public announcements of capital expenditures, and other firms do not release financial information on announced programs, P&P's survey must be considered conservative. Cost data for proposed, not-yet-approved projects are not included in the tabulations.

Information in the annual capital spending survey is compiled from data reported directly to P&P from information that has been publicly released. Data do not normally include spending for woodlands nor for off-site converting facilities. (Copies of these listings are available, see page 112 for information.)

The tables and lists in this report are compiled from the individual mill programs for the three-year period 1981-83. In addition, information on programs for later completion (1984-86) is included; these data are noted in footnotes to the tables. Assignment of cost data to the various categories (for example, pulping, new machines,

Photo above shows construction at International Paper Co.'s $575-million containerboard complex at Mansfield, La.

modifications, and water quality) is based on reports from the companies where available, or is made by P&P, and should be considered as approximations.

UNITED STATES

South to spend 60% of total; West drops to 11% (six-year low)

Total dollar value of spending plans for U.S. mills reported by P&P in this 1982 survey comes to $10.328 billion, a very modest 3% increase over the amount reported last year. Interestingly, more than one-fourth of reported spending is for projects to be completed in 1984 and later, with $7.53 billion for the near-term 1981-83 period.

The South continues its lead over other U.S. regions in expansion plans and accounts for 60% of the spending reported in this survey (up from last year's 55%). Mississippi once again exceeds $1 billion in spending programs. Other southern states reporting programs totaling more than $500 million are: Louisiana ($896 million); Georgia ($870 million); Alabama ($839 billion); South Carolina ($727 million); and Florida ($539 million).

Spending plans in the Midwest account for 19% of the total reported spending, as was true in the 1981 survey. Michigan leads in this region with $876 million; Wisconsin is in second place with $512 million.

The Mountain/Pacific states dropped from 16% to 11% of total spending reported, due primarily to completion of some large programs, as well as the long-run shift in new capacity growth to the South. Washington again leads other western states, reporting $775 million in programs.

The Northeast states continue to account for 10% of total U.S. spending. Maine is this region's leader, reporting $912 million, nearly 30% above the 1981 level.

The big spenders. Six companies report spending plans of more than $500 million. Leader in spending is Weyerhaeuser, with a total of $1.2 billion (two-thirds of this for the big Columbus, Miss., mill project). International Paper, in second place ($878 million), is also putting the bulk of its expenditures into a greenfield mill (Mansfield, La.). No. 3 spender, St. Regis Paper, is spreading its $821 million over a number of major projects, with two each at $296 million (Pensacola, Fla., and Sartell, Minn.).

Champion's spending plans of $802 million place it in No. 4 position; most of this for the new Quinnesec, Mich., mill ($483 million) and a major expansion at Courtland, Ala. ($184 million). Crown Zellerbach is No.

SEVEN-YEAR CAPITAL SPENDING TRENDS

UNITED STATES

Year	Period	P&P's reported three-year spending ($ billion) Production	Environment Water	Environment Air	Total	Annual capital expenditures[1]
1982	1981-83	$6.216[2]	$0.635[3]	$0.677	$7.528[2]	$(6.50)[4]
1981	1980-82	7.783[2]	0.531	0.568	8.882[2]	6.54
1980	1979-81	8.003[2]	0.515	0.360	8.001[2]	6.80
1979	1978-80	4.911	0.350	0.251	5.759[5]	5.55
1978	1977-79	4.431	0.611	0.307	5.489[5]	4.41
1977	1976-78	3.455	0.783	0.433	5.001[5]	3.36
1976	1975-77	3.410	0.626	0.715	5.651[5]	3.27

1. Based on data from U.S. Commerce Dept; data for 1978, 1979 and 1980 have been revised.
2. 1982 data does not include $2.8 billion estimated for projects to be completed in 1984-86; 1981 data does not include $1.150 billion estimated to be spent in 1983-85; 1980 data does not include $0.877 billion estimated to be spent in 1982-85.
3. Includes $0.050 billion designated for 'Solid waste' control.
4. P&P estimate
5. Includes unallocated funds of $0.246 billion for 1979; $0.140 billion for 1978; $0.320 billion for 1977; $0.900 billion for 1976 surveys.

CANADA

Year	Period	P&P's reported three-year spending (C$ billion) Production	Environment Water	Environment Air	Total	Annual capital expenditures[1]
1982	1981-83	C$3.949[2]	C$0.438[3]	C$0.365	C$4.752[2]	C$(3.00)[4]
1981	1980-82	3.645[2]	0.303	0.329	4.277[2]	2.606
1980	1979-81	2.440[2]	0.187	0.135	2.078[2]	1.954
1979	1978-80	1.462	0.110	0.113	1.685	1.426
1978	1977-79	1.442	0.166	0.112	1.720	1.143
1977	1976-78	2.169	0.189	0.157	2.518	1.171
1976	1975-77	2.062	0.228	0.135	2.425	1.058

1. Data from Statistics Canada; includes capital and repair expenditures for equipment and facilities.
2. 1982 data does not include C$0.814 billion estimated for projects to be completed in 1984-86; 1981 data does not include $0.643 billion estimated to be spent in 1983-85; 1980 data does not include $0.684 billion estimated to be spent in 1982-85.
3. Includes C$0.031 billion designated for 'Solid waste' control.
4. P&P estimate.

5, with $531 million in planned spending—the bulk for expansions at Camas, Wash. ($375 million) and Bogalusa, La. ($130 million).

New mills and machines. The list of new greenfield mills is enlarged by six announcements during 1981 for proposed mills: Champion, Halifax, N.C.; Georgia Kraft, Elberton, Ga., ISA International, Boligee, La.; Inland Container, Rancho Cucamonga, Calif.; Kimberly-Clark, southeast U.S.; and Union Camp, Eastover, S.C. Union Camp's project is the only one with a startup target. Removed from the list of proposed mills is the Toypack project, cancelled by the financial difficulties of its joint sponsor, Toyo Pulp Co. of Japan.

Three units were added to the list of new paper machines scheduled for installation at U.S. mills: Augusta Newsprint (Abitibi), Augusta, Ga.; Philip Morris/Wisconsin Tissue, Menasha, Wis.; and Scott Paper, Skowhegan, Maine.

Of the 30 machines reported, 14 are for printing/writing (6 for coated groundwood, 8 for free-sheet); 2 are for newsprint, 4 for tissue, 3 for kraft grades, 1 for specialty (security) papers, and 6 for linerboard and corrugating medium. Eleven machines that started operation in 1981 are included in the list.

Spending by categories. Programs in the "pulping/fiber" category (which include woodyard, chipping, and deinking facilities) total $2.9 billion, 28% of total U.S. spending. Of this, 66% is for mills in the South. In addition to major pulp capacity expansions at existing mills and construction of new mills, the pulp-category spending total includes a substantial portion for recovery boilers (new and modified).

Spending programs for new paper/board machines, at $1.2 billion, represent 11% of the total. The South will spend 62% of this amount.

Expenditures reported for upgrading and modernizing existing machines total $655 million. The Midwest mills will spend 37% of this sum, with 35% allocated for mills in the South.

A reflection of this early-1980s economic situation is increased attention to energy conservation. In view of this new emphasis, P&P added a new spending category for this 1982 survey: "energy/power." Counting up the programs for new boilers, conversions of old boilers to use less-expensive and woodwaste fuels, plus "normal" power and energy programs produced a total of $1.8 billion, 17% of total U.S. spending plans.

Expenditures listed under "plant/miscellaneous" cannot be compared to last year's data, since all energy-related figures are omitted in this 1982 report. What is included in the 1982 figure of $2.5 billion are areas such as finishing and shipping facilities, storage and office space, or anything reported as "miscellaneous" or "general improvements."

Spending programs for environmental projects, at $1.3 billion, are up 19% from the 1981 survey, probably

TOP SPENDERS IN U.S.

Companies for which P&P reports capital spending plans of $100,000,000 or more, including production and environmental programs

	1981-83	1980-82
Weyerhaeuser	$1,243,100,000*	$1,214,100,000
International Paper	878,000,000	882,225,000
St. Regis Paper	820,638,000	703,432,000
Union Camp	803,900,000*	401,900,000
Champion International	800,974,000*	947,757,000
Crown Zellerbach	530,900,000*	398,500,000
Mead Corp.	440,200,000	393,200,000
Leaf River Pulp Mill	400,000,000*	400,000,000
Scott Paper	395,500,000	141,400,000
MacMillan Bloedel	318,355,000	322,836,000
Hammermill Paper	274,346,000	140,994,000
Boise Cascade	270,000,000	474,000,000
Continental Forest Industries	262,000,000	212,800,000
Augusta Newsprint (Abitibi)	243,495,000	—
Procter & Gamble	200,000,000	200,000,000
Madison Paper Industries	185,000,000	185,000,000
Potlatch Corp.	184,594,000	258,591,000
Great Northern Nekoosa	176,349,000*	187,360,000
Federal Paper Board	175,130,000	107,350,000
Midtec	144,240,000	236,951,000
Westvaco	140,000,000	125,000,000
ITT Rayonier	124,800,000	125,200,000
Longview Fibre	119,000,000	80,300,000
Container Corp.	115,000,000	126,300,000
Willamette Industries	113,000,000	75,700,000
Philip Morris Industrial	106,113,000	37,928,000

*Includes programs for 1984-86 completion.

SUMMARY OF U.S. PROJECTS— REPORTED EXPENDITURES, 1981-83+[1] BY STATES (000 dollars)

STATE	PRODUCTION	ENVIRONMENTAL	TOTAL
Alabama	$ 730,755	$108,170	$ 838,925
Alaska	4,300	—	4,300
Arizona	45,000	—	45,000
Arkansas	11,886	21,699	33,585
California	80,900	—	80,900
Connecticut	7,330	300	7,630
Florida	487,013	52,317	539,330
Georgia	766,977	103,400	870,377
Idaho	73,633	144	73,777
Illinois	7,520	—	7,520
Indiana	6,338	55	6,393
Kentucky	73,000	—	73,000
Louisiana	793,936	102,436	896,372
Maine	799,213	112,937	912,150
Massachusetts	18,121	—	18,121
Michigan	723,993	152,394	876,387
Minnesota	349,143	73,591	422,734
Mississippi	1,017,131	180,000	1,197,131
New Hampshire	325	5,050	5,375
New York	22,516	1,023	23,539
North Carolina	355,959	45,559	401,518
Ohio	175,700	20,359	196,059
Oklahoma	184,000	16,000	200,000
Oregon	99,057	21,830	120,887
Pennsylvania	40,302	4,950	45,252
South Carolina	636,500	90,000	726,500
Tennessee	6,000	785	6,785
Texas	107,436	17,920	125,356
Virginia	255,150	26,300	281,450
Washington	680,885	94,300	775,185
West Virginia	215	4,600	4,815
Wisconsin	455,792	56,147	511,939
Total	**$8,016,063[2]**	**$1,312,266**	**$10,328,319[2]**

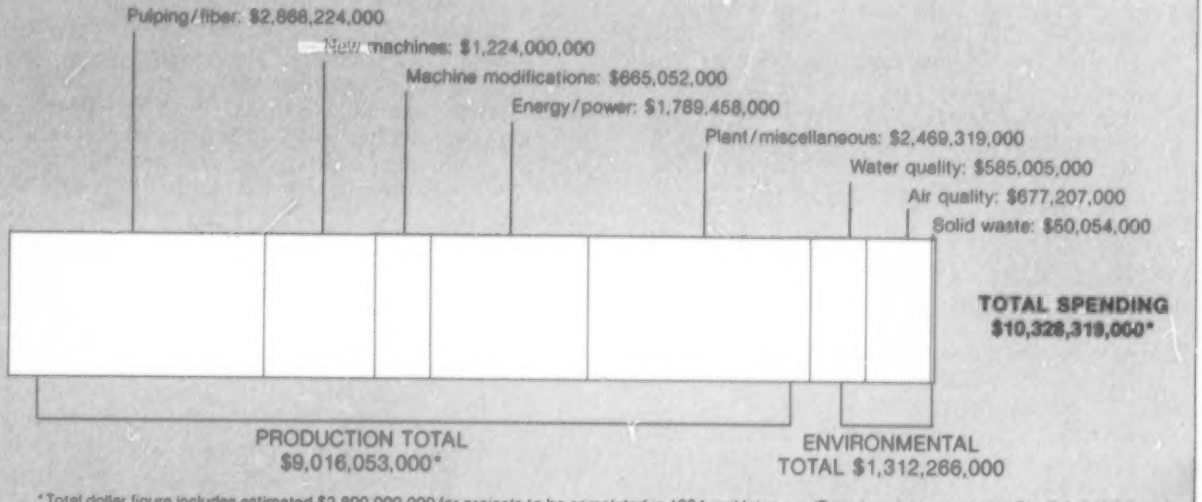
1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes roughly $2,800,000,000 to be completed in 1984 and later. Over 80% of this is for four greenfield mills (Champion, Quinnesec; Leaf River, Hattiesburg; Union Camp, Eastover; Weyerhaeuser, Columbus). Approximately $500,000,000 is for modernization/expansion programs at existing mills.

due more to better assignment of costs than from a new round of environmental control programs. For the first time, P&P requested data on programs for solid waste control. These represent about 4% of the environmental total. Expenditures for water quality are 44% of the total, and for air quality 52%.

Spending according to region. The New England states report spending plans of $943 million, a 25% increase from the 1981 report. Almost all (96% of total spending) pulp/paper activity in New England is going on in Maine, with major programs underway by Great Northern, Madison, St. Regis, and Scott.

No large programs are underway in the mid-Atlantic states, and spending plans for this region are a modest

UNITED STATES REPORTED SPENDING 1981-83+, BY TYPE OF FACILITY



*Total dollar figure includes estimated $2,800,000,000 for projects to be completed in 1984 and later. (Based on data reported to PULP & PAPER)

UNITED STATES—REPORTED CAPITAL EXPENDITURES FOR 1981-83+[1] BY REGIONS AND BY TYPE OF FACILITY (000 dollars)

PRODUCTION:	PULPING/ FIBER		NEW MACHINES		MACHINE MODIFICATIONS		ENERGY/ POWER		PLANT/ MISCELLANEOUS	
New England	$ 165,963	6%	$ 135,000	11%	$ 55,090	8%	$ 175,695	10%	$ 293,241	12%
Mid-Atlantic	27,380	1%	—	—	30,400	5%	—	—	5,038	0%
East North Central	313,994	11%	148,000	12%	242,460	36%	205,430	11%	459,486	19%
West North Central	159,000	6%	45,000	4%	5,000	1%	42,283	2%	97,860	4%
South Atlantic	841,464	29%	225,000	18%	101,755	15%	867,935	49%	465,660	19%
East South Central	724,881	25%	286,000	23%	29,205	4%	141,600	8%	645,200	26%
West South Central	342,050	12%	250,000	21%	104,381	16%	171,000	10%	229,827	9%
Mountain Pacific	293,492	10%	135,000	11%	96,761	15%	185,515	10%	273,007	11%
Total	**$2,868,224**	**100%**	**$1,224,000**	**100%**	**$ 665,052**	**100%**	**$1,789,458**	**100%**	**$2,469,319**	**100%**

ENVIRONMENT:	WATER QUALITY		AIR QUALITY		SOLID WASTE	
New England	$ 50,567	9%	$ 59,100	9%	$ 8,620	17%
Mid-Atlantic	4,600	1%	450	0%	923	2%
East North Central	119,366	20%	107,589	16%	2,000	4%
West North Central	35,860	6%	35,948	5%	1,783	4%
South Atlantic	109,750	19%	189,926	28%	22,500	45%
East South Central	136,095	23%	142,610	21%	10,250	20%
West South Central	73,677	13%	80,400	12%	3,978	8%
Mountain Pacific	55,090	9%	61,184	9%	—	—
Total	**$ 585,005**	**100%**	**$ 677,207**	**100%**	**$ 50,054**	**100%**

GRAND TOTAL PRODUCTION & ENVIRONMENT		
New England	$ 943,276	9%
Mid-Atlantic	68,791	1%
East North Central	1,596,325	15%
West North Central	422,734	4%
South Atlantic	2,823,990	27%
East South Central	2,115,841	21%
West South Central	1,255,313	12%
Mountain/Pacific	1,100,049	11%
	$10,328,319[2]	**100%**

1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes an estimated $2,800,000,000 to be spent for projects to be completed in 1984 and later.

Regions are as follows:
New England: Me., Vt., N.H., Conn., R.I., Mass.
Mid-Atlantic: N.Y., N.J., Pa.
East North Central: Wis., Mich., Ill., Ind., Ohio
West North Central: N.D., S.D., Neb., Kans., Minn., Iowa, Mo.
South Atlantic: Del., Md., W. Va., Va., N.C., S.C., Ga., Fla.
East South Central: Ky., Tenn., Miss., Ala.
West South Central: Okla., Tex., Ark., La.
Mountain/Pacific: Wash., Ore., Calif., Alaska, Ida., Nev., Mont., Wyo., Utah, Ariz., Colo., N.M.

$69 million.

East North Central states are spending $1.6 billion, up 10% over last year's survey. Most of this (87%) will be spent in Michigan and Wisconsin. Major projects in Michigan are those of Champion (Quinnesec) and Mead (Escanaba). Spending in Wisconsin is led by expansions at Midtec, Pentair, and Philip Morris (Wisconsin Tissue).

Data for West North Central states was received only from Minnesota—$423 million, 4% of national total.

South Atlantic states are spending $2.8 billion, nearly 60% above the 1981 figure. Much of this increase can be attributed to 1981 announcements by Union Camp for a new mill at Eastover, S.C., and by Augusta Newsprint (Abitibi) for a major expansion at Augusta, Ga. Other over-$100-million projects in these states are those of St. Regis at Pensacola, Fla.; Union Camp at Savannah, Ga.; Procter & Gamble at Oglethorpe, Ga; and Federal Paper at Riegelwood, N.C.

East South Central states' spending plans total $2.1 billion; though 16% below last year's report, they represent a number of large investments. Mississippi claims

NEW 'GREENFIELD' MILLS IN U.S., BUILT AND/OR PROPOSED

Champion International, Quinnesec, Mich. **1985**
265,000-tpy bleached hardwood kraft pulp mill

Champion International, Halifax, N.C. **Late 1980s**
Proposed pulp/white paper complex

Champion International, Kirbyville, Texas **No date**
Proposed 350,000-tpy unbleached pulp/linerboard mill

Georgia Kraft, Elberton, Ga. **No date**
Site purchased for 455,000-tpy linerboard mill

ISA International, Boligee, La. **No date**
Proposed 210,000-tpy newsprint mill

Inland Container, Rancho Cucamonga, Calif. **No date**
Feasibility study for possible recycled linerboard mill

International Paper Co., Mansfield, La. **1981**
460,000-tpy linerboard, 270,000-tpy corrugating medium*

Kimberly-Clark, Southeast U.S. **No date**
Possible new pulp mill to supply fiber for disposable diapers

Leaf River Pulp Mill, Hattiesburg, Miss. **1984**
Proposed 315,000-tpy bleached kraft pulp mill

Lextar, Deer Park, Texas **1981**
27,500-tpy polyolefin pulp plant

North Mississippi Paper Mill, Batesville, Miss. **No date**
Proposed 200,000-tpy newsprint mill

Portals Inc., Hawkinsville, Ga. **1982**
1800-tpy security papers mill*

Procter & Gamble, Oglethorpe, Ga. **1981**
300,000-tpy bleached kraft pulp mill

Tenma Paper Mills & Co., Brunswick, Ga. **No date**
Proposed 70-80,000-tpy clay-coated SBS foodboard mill

Union Camp, Eastover, S.C. **1984**
210,000-tpy uncoated free-sheet white paper mil*

Weyerhaeuser, Columbus, Miss. **1982-85**
Three-machine pulp/paper complex; first phase for 175,000-tpy coated groundwood papers*

*Machine is also listed under "New Machines"

NEW PAPER MACHINES IN U.S.

Augusta Newsprint (Abitibi), Augusta, Ga. **1983**
226,000-tpy, 346-in.-trim Valmet—newsprint

Blandin Paper, Grand Rapids, Minn. **No date**
Possible new groundwood specialty machine

Boise Cascade, Rumford, Maine **1981**
158,000-tpy, 316-in.-wire, 3500-fpm Valmet—ctd. groundwood

Champion International, Courtland, Ala. **1983**
145,000-tpy machine—uncoated free sheet

Crown Zellerbach, Camas, Wash. **1984**
160,000-tpy machine—uncoated free sheet

Fort Howard Paper Co., Muskogee, Okla. **1981**
96,000-tpy machine—tissue/napkin

Georgia-Pacific, Crossett, Ark. or Palatka, Fla. **1983+**
300,000-tpy, 349-in.-trim machine—sack kraft/linerboard

Georgia-Pacific, Palatka, Fla. **1981**
60,000-tpy, 211-in.-trim Beloit—tissue

Georgia-Pacific, Port Hudson, La. **1982+**
138,000-tpy machine—white bond/offset

International Paper, Mansfield, La. **1981**
Two 348-in.-trim, 2500-fpm Tampella fourdriniers—460,000-tpy linerboard, and 270,000-tpy corrugating medium

Longview Fibre, Longview, Wash. **No date**
No. 12 machine—lightweight kraft

MacMillan Bloedel, Pine Hill, Ala. **1983**
210,000-tpy, 284-in.-wire, 2500-fpm Tampella—corr. medium

Madison Paper Industries, Madison, Maine **1981**
165,000-tpy, 282-in.-trim Valmet fourdrinier—sc groundwood

Mead Corp., Escanaba, Mich. **1982**
200,000-tpy, 330-in.-trim, 3000-fpm Valmet—ctd. groundwood

Mead Corp., Chillicothe, Ohio **1981**
179,000-tpy, 300-in.-trim, 3000-fpm Valmet—free-sheet

Philip Morris/Wisconsin, Menasha, Wis. **1983**
60,000-tpy, 208-in.-trim Beloit—tissue

Portals Inc., Hawkinsville, Ga. **1982**
1800-tpy security papers machine

St. Regis Paper Co., Pensacola, Fla. **1983**
236,000-tpy, 370-in.-wire, 2600-fpm Beloit—kraft paper

St. Regis Paper Co., Sartell, Minn. **1982**
170,400-tpy machine—lightweight coated groundwood

Scott Paper, Skowhegan, Maine **1983**
200,000-tpy, 290-in.-trim, 3000-fpm machine—coated free-sheet

Scott Paper, Everett, Wash. **1981**
53,000-tpy 'advanced technology' machine—tissue

Stone Container/S.C. Industries, Florence, S.C. **1981**
105,000-tpy, 172-in.-trim, 2500-fpm Carcano—linerboard

Union Camp, Eastover, S.C. **1984**
600-tpd machine—uncoated free-sheet

Westvaco, Wickliffe, Ky., or Luke, Md. **No date**
150,000-tpy machine—coated free-sheet

Weyerhaeuser, Columbus, Miss. **1982**
175,000-tpy machine—lightweight coated groundwood
Uncoated free-sheet machine; second LWC unit (1983-85)

Weyerhaeuser, Valliant, Okla. **1982**
194,000-tpy, 260-in.-trim, KMW-Johnson—linerboard

Weyerhaeuser/Norpac, Longview, Wash. **1981**
210,000-tpy, 352-in.-trim, 4000-fpm Beloit—newsprint

Willamette, Hawesville, Ky. **1981**
100,000-tpy, 270-in.-trim Valmet twin-wire—uncoated free-sheet

the giant Weyerhaeuser complex at Columbus and the Leaf River pulp mill at Hattiesburg (together over $1.3 billion). In Alabama, major expansions are underway at Champion, Courtland; Hammermill, Selma; and MacMillan Bloedel, Pine Hill.

Spending plans in West South Central states are $1.255 billion, a drop of 7% from a year ago. Largest investment here is IP's greenfield mill at Mansfield, La. Other major expansion programs are Crown Zellerbach at Bogalusa, La.; Weyerhaeuser at Valliant, Okla.; and St. Regis at Houston, Texas.

Total spending in the Mountain/Pacific states, at $1.1 billion, is 30% below year-ago data. A number of major expansions have been completed, and only one program now underway (Crown Zellerbach at Camas, Wash.) exceeds $100 million.

The data in P&P's survey cannot be considered official, but it appears to indicate that the industry is in a temporary holding pattern—a wave of large capital investment programs came on-stream in 1980 and 1981, and another wave of large programs is in the wings (scheduled for 1984-86). In the U.S. in 1982-83, only one large greenfield mill is scheduled to start (Weyerhaeuser, Columbus, Miss.), but 12 to 15 paper machines should come into operation.

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN U.S.

(over $45,000,000 at an existing mill site)

Alton Packaging, Jacksonville, Fla.	$ 54,000,000
Augusta Newsprint (Abitibi), Augusta, Ga.	243,495,000*
Boise Cascade, Rumford, Maine	265,000,000*
Bowater Inc., Catawba, S.C.	63,500,000
Champion International, Courtland, Ala.	183,85[illegible],000*†
Champion International, Canton, N.C.	62,959,[illegible]
Chesapeake, West Point, Va.	89,700,0[illegible] †
Container Corp., Fernandina Beach, Fla	75,000,00[illegible]
Continental Forest Industries, Hodge, La.	64,000,000
Continental Forest Industries, Hopewell, Va.	147,000,000
Crown Zellerbach, Bogalusa, La.	130,000,000
Crown Zellerbach, Camas, Wash.	375,000,000*†
Federal Paper Board, Riegelwood, N.C.	141,100,000
Fort Howard, Muskogee, Okla.	75,000,000*
Georgia-Pacific, Palatka, Fla.	45,000,000*
Great Northern Nekoosa, Millinocket, Maine	47,498,000 †
Hammermill, Selma, Ala.	202,000,000
ITT Rayonier, Jesup, Ga.	118,800,000
International Paper, Bastrop, La.	64,000,000
Longview Fibre, Longview, Wash.	115,000,000
MacMillan Bloedel, Pine Hill, Ala.	295,405,000*
Madison Paper Industries, Madison, Maine	185,000,000*
Mead Corp., Escanaba, Mich.	285,000,000*
Mead Corp., Chillicothe, Ohio	126,000,000*
Midtec, Kimberly, Wis.	133,650,000
Pentair/Niagara, Niagara, Wis.	46,500,000 †
Pentair/Flambeau, Park Falls, Wis.	46,400,000 †
Philip Morris/Wisconsin, Menasha, Wis.	78,113,000*
Potlatch/Pulp & Paperboard, Lewiston, Idaho	72,839,000
Potlatch/Northwest, Cloquet, Minn.	108,113,000
St. Joe Paper, Port St. Joe, Fla.	63,000,000 †
St. Regis Paper, Pensacola, Fla.	295,999,000
St. Regis Paper, Bucksport, Maine	86,701,000
St. Regis Paper, Sartell, Minn.	295,713,000*
St. Regis Paper, Houston, Texas	83,537,000
Scott Paper, Skowhegan, Maine	195,000,000*
Scott/Warren, Westbrook, Maine	65,000,000
Southwest Forest Industries, Snowflake, Ariz.	45,000,000
Stone Container/S.C. Industries, Florence, S.C.	55,000,000*
Union Camp, Savannah, Ga.	165,700,000
Weyerhaeuser, Valliant, Okla.	115,000,000*
Weyerhaeuser/Norpac, Longview, Wash.	164,000,000*
Willamette, Hawesville, Ky.	73,000,000*

*Includes new paper machine shown in listing on preceding page
†Includes programs for 1984-86 completion

Dollar figures are not available for some expansion programs that include new paper machines: Georgia-Pacific, Crossett, Ark., and Port Hudson, La.; Westvaco, Luke, Md., or Wickliffe, Ky.

CANADA

Plans include 16 new machines, government-supported expansions

Spending plans for Canadian pulp and paper companies reported by P&P in its 1981-83 survey total C$5.66 billion, a rise of 13% over last year's report. Some $800 million of this is for projects to be completed in 1984-86.

British Columbia continued to maintain its No. 1 position as the Canadian province with the largest spending programs. But its $1.7-billion total this year (down 9% from 1981's figure) is only 30% of the national total, compared with 42% in 1981 and 47% in 1980. Ontario, in No. 2 spot with $1.57 billion, represents 28% of the total; Quebec's $1.2 billion is 21%; New Brunswick, at $628 million is 11%. These four provinces account for 90% of Canada's spending plans.

Mills in eastern Canada (in Ontario, Quebec, New Brunswick, and Nova Scotia) benefit from financial grants from provincial and federal governments, as part of Canada's program to help improve the competitive position of the pulp/paper industry. The Western provinces do not participate in the program since they generally (British Columbia in particular) have modern facilities.

Company spending plans. Abitibi-Price, which is undertaking major expansions at a number of mills, takes

SUMMARY OF CANADIAN PROJECTS— REPORTED EXPENDITURES 1981-83[1] BY PROVINCES (000 Canadian dollars)

PROVINCE	PRODUCTION	ENVIRONMENTAL	TOTAL
Alberta	$ 154,440	$ 24,000	**$ 178,440**
British Columbia	1,435,054	265,527	**1,700,581**
Manitoba	6,850	27	**6,877**
New Brunswick	557,368	70,304	**627,672**
Newfoundland	165,050	20,000	**185,050**
Nova Scotia	78,644	7,050	**85,694**
Ontario	1,398,781	170,776	**1,569,557**
Quebec	938,513	245,553	**1,184,066**
Saskatchewan	28,350	—	**28,350**
Total	**$4,763,050[2]**	**$803,237**	**$5,566,287[2]**

1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes $814,000,000 for projects to be completed in 1984 and later. Included are the BCFP greenfield mill in Alta., and major expansion programs (over $75,000,000) at Boise, Kenora; Con-Bath, Ville de La Baie; and Fraser, Atholville.

No. 1 spot in company capital-spending plans with $483 million. Four other firms report planned expenditures in excess of $300 million: B.C. Forest Products, Consolidated-Bathurst, Great Lakes, and Northwood Pulp. Altogether, 20 Canadian companies report spending plans for at least $100 million, compared to 16 companies in the 1981 survey; 11 of these include projects for 1984-86 completion. *(Continued)*

CANADA—REPORTED CAPITAL EXPENDITURES FOR 1981-83+[1] BY REGIONS AND BY TYPE OF FACILITY (000 Canadian dollars)

PRODUCTION:	PULPING/ FIBER		NEW MACHINES		MACHINE MODIFICATIONS		ENERGY/ POWER		PLANT/ MISCELLANEOUS	
Maritimes	$ 350,454	18%	$ 37,000	6%	$ 74,631	17%	$ 205,659	35%	$ 133,318	11%
Quebec	361,834	18%	96,300	17%	227,880	52%	94,242	16%	158,257	13%
Ontario	512,415	26%	210,000	37%	98,022	22%	166,648	29%	411,696	35%
Central	26,190	1%	—	—	4,400	1%	—	—	4,610	1%
West	748,414	37%	225,000	40%	33,223	8%	119,248	20%	463,609	40%
Total	**$1,999,307**	**100%**	**$568,300**	**100%**	**$438,156**	**100%**	**$ 585,797**	**100%**	**$1,171,490**	**100%**

ENVIRONMENT:	WATER QUALITY		AIR QUALITY		SOLID WASTE		GRAND TOTAL PRODUCTION & ENVIRONMENT		
Maritimes	$ 43,723	11%	$ 53,504	15%	$ 127	0.4%	Maritimes	$ 898,416	16%
Quebec	132,400	32%	82,138	23%	31,015	99.6%	Quebec	1,184,066	21%
Ontario	92,575	23%	78,021	21%	—	—	Ontario	1,569,557	28%
Central	27	0%	—	—	—	—	Central	35,227	1%
West	138,500	34%	151,027	41%	—	—	West	1,879,021	34%
Total	**$ 407,225**	**100%**	**$364,870**	**100%**	**$ 31,142**	**100%**		**$5,566,287***	**100%**

1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes estimated C$814,000,000 for projects to be completed in 1984-86 period.

Note: Tabulations are based on these regional divisions: "Maritimes" is New Brunswick, Newfoundland, and Nova Scotia; "Central" is Manitoba and Saskatchewan; "West" is British Columbia and Alberta; Ontario and Quebec are treated individually.

TOP SPENDERS IN CANADA

Companies for which P&P reports capital spending plans of $100,000,000 or more, including production and environmental programs (Canadian dollars)

	1981-83	1980-82
Abitibi-Price	$483,245,000*	$302,045,000
B.C. Forest Products	383,323,000*	383,731,000
Consolidated-Bathurst	371,569,000*	317,710,000
Great Lakes Forest Products	340,000,000	430,000,000
Northwood Pulp & Timber	310,000,000	150,000,000
E.B. Eddy Forest Products	309,164,000*	290,117,000
Ontario Paper	277,597,000*	267,037,000
Western Forest Products	272,000,000	250,000,000
CIP Inc.	252,600,000*	205,500,000
MacMillan Bloedel	245,116,000	136,200,000
Fraser Inc.	228,500,000	10,387,000
Boise Cascade Canada	220,000,000*	35,000,000
Domtar Inc.	203,925,000*	195,993,000
Reed Paper	198,800,000*	—
Crown Zellerbach Canada	186,300,000	186,300,000
Donohue Normick	165,000,000	165,000,000
Scott Paper	150,000,000*	—
Kimberly-Clark of Canada	142,928,000*	136,200,000
Canadian Forest Prod.	127,055,000	34,553,000
Eurocan Pulp & Paper	100,000,000	240,000

*Includes programs for 1984-86 completion.

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN CANADA

(over $35,000,000 at an existing mill site)

Abitibi-Price, Grand Falls, Nfld.	$ 54,600,000*
Abitibi-Price, Stephenville, Nfld.	130,4500,000
Abitibi-Price, Iroquois Falls, Ont.	117,100,000
Acadia Forest Prods., Nelson-Miramichi, N.B.	47,999,000
American Can of Canada, Marathon, Ont.	72,205,000*
BC Timber, Prince Rupert, B.C.	47,045,000
Boise Cascade Canada, Nelson-Miramichi, N.B.	35,000,000
Boise Cascade Canada, Fort Frances, Ont.	35,000,000*
Boise Cascade Canada, Kenora, Ont.	150,000,000*
B.C. Forest Products, Crofton, B.C.	161,973,000
CIP Inc., Dalhousie, N.B.	144,500,000
CIP Inc., Toronto, Ont.	36,000,000
Canadian Forest Products, Port Mellon, B.C.	106,528,000
Consolidated-Bathurst, Bathurst, N.B.	98,000,000
Consolidated-Bathurst, Shawinigan, Que.	43,290,000
Consolidated-Bathurst, Trois Rivières, Que.	75,273,000*
Consolidated-Bathurst, Ville de La Baie, Que.	99,234,000*
Crown Zellerbach Canada, Campbell River, B.C.	176,100,000
Domtar, Cornwall, Ont.	51,800,000*
Domtar, Donnacona, Que.	54,150,000*
Donohue, Clermont, Que.	46,835,000
E.B. Eddy Forest Products, Espanola, Ont.	284,023,000*
Eurocan, Kitimat, B.C.	100,000,000
Fraser, Atholville, N.B.	170,430,000
Fraser, Edmundston, N.B.	58,150,000
Great Lakes Forest Products, Dryden, Ont.	340,000,000
Kimberly-Clark/Spruce Falls, Kapuskasing, Ont.	88,200,000
MacMillan Bloedel, Powell River, B.C.	166,000,000
Northwood Pulp & Timber, Prince George, B.C.	310,000,000
Nova Scotia Forest Ind., Point Tupper, N.S.	53,260,000
Ontario Paper, Thorold, Ont.	265,277,000*
P&W/St. Anne Nackawic, Nackawic, N.B.	60,000,000*
Reed Paper, Quebec City, Que.	159,800,000*
Scott Paper, New Westminster, B.C.	63,000,000*
Tembec Forest Products, Temiscaming, Que.	43,060,000
Western Forest Products, Port Alice, B.C.	47,000,000
Western Forest Products, Squamish, B.C.	205,000,000

*Includes programs for 1984-86 completion

Spending plans for expansions and modernization at existing mill sites reflect, in Canada as in the U.S., the economics of incremental capacity expansions vs new mill construction. Expansion/modernization expenditures of $35 million and over are shown for 37 Canadian mill sites; 13 of these include new paper machines. Five of the programs are priced at over $200 million: E.B. Eddy, Espanola, Ont; Great Lakes, Dryden, Ont.; Northwood Pulp, Prince George, B.C.; Ontario Paper, Thorold, Ont; and Western Forest Products, Squamish, B.C.

New mills and new machines. No new greenfield mills were announced in Canada in 1981. One mill was started in late 1981 (Quesnel River Pulp in B.C.) and another is targeted for 1982 operation (Donohue Normick in Que.).

The number of new paper machines listed for Canada in this survey has increased to 16. Of these, 12 are for newsprint, including seven machines designed for 1982 startup (some of these replace existing units). Other new machines in Canada are two units designed for tissue, and one each for groundwood specialties, uncoated freesheet, and corrugating medium.

Spending by categories. Expenditures for "pulping/fiber" (which include woodyward and chipping facilities) continue to lead all other categories for Canada in P&P's survey. The $2 billion reported in 1982 for pulping expenditures represents 35% of the total. Spending for new machines ($568 million) is 10% and for machine modifications ($438 million) is 8% of Canada's total. New this year is a separate division for "energy/power" expenditures, and Canadian mills report $586 million for this category, 10% of total. This is a lower percentage than reported by U.S. mills, and reflects the lower cost of energy for Canadian mills.

Spending for production-related programs in Canada in this 1982 survey is 86% of total, with 14% allocated for environmental programs. Environmental spending was 13% of the 1981 survey total; 12% in 1980. □

NEW 'GREENFIELD' MILLS IN CANADA, BUILT AND/OR PROPOSED

B.C. Forest Products, Hurdy, Alta. — **1985**
160,000-m-tpy newsprint mill*

Doman Industries, Duke Point, B.C. — **No date**
Proposed 175,000-m-tpy TMP mill

Donohue Normick, Amos, Que. — **1982**
159,000-tpy newsprint mill*

Makin Project Ltd., Red Deer, Alta. — **No date**
Proposed 175,000-m-tpy CMP pulp/paper mill

Quebec Public Works Ministry, Maniwaki, Que. — **1984**
Proposed 300-400-m-tpd medium-density fiberboard mill

Quesnel River Pulp, Quesnel, B.C. — **1981**
159,000-m-tpy TMP mill

Rexfor/Soucy, Matane, Que. — **No date**
Proposed 175,000-m-tpy TMP/newsprint mill

*Machine is also listed under "New Machines"

NEW PAPER MACHINES IN CANADA

Abitibi-Price, Grand Falls, Nfld. — **1984**
Newsprint machine

Abitibi-Price, Iroquois Falls, Ont. — **1982**
190,000-m-tpy, 348-in.-trim, 3200-fpm Valmet—newsprint

B.C. Forest Products, Hurdy, Alta. — **1985**
160,000-m-tpy machine—newsprint

B.C. Forest Products, Crofton, B.C. — **1982**
175,000-m-tpy Beloit twin-wire—newsprint

CIP Inc., Toronto, Ont. — **1981**
27,000-m-tpy, 176-in.-trim, 6000-fpm KMW twin-wire—tissue

Consolidated-Bathurst, Bathurst, N.B. — **1986**
Replacement of existing machine—corrugating medium

Consolidated-Bathurst, Trois Rivières, Que. — **1982**
70,000-m-tpy Black Clawson-Kennedy—groundwood spec.

Crown Zellerbach Canada, Campbell River, B.C. — **1982**
175,000-m-tpy, 360-in.-wire, 4000-fpm Valmet—newsprint

Donohue-Normick, Amos, Que. — **1982**
159,000-m-tpy, 300-in.-trim, 3500-fpm Dominion—newsprint

Great Lakes Forest Products, Dryden, Ont. — **No date**
Possible 175,000-m-tpy machine—newsprint

Kruger Inc., Trois Rivières, Que. — **1982**
172,000-m-tpy machine (from storage)—newsprint

Maclaren, Masson Que. — **1983**
Proposed 195,000-m-tpy machine—newsprint

MacMillan Bloedel, New Westminster, B.C. — **No date**
75,000-m-tpy, 179-in.-wire, 3000-fpm Valmet—uncoated free sheet (postponed)

MacMillan Bloedel, Powell River, B.C. — **1981**
160,000-m-tpy, 330-in.-trim, 3500-fpm Beloit—newsprint

Ontario Paper, Thorold, Ont. — **1982**
Two 300-in.-trim Beloit (310,000-m-tpy total)—newsprint

Scott Paper, New Westminster, B.C. — **1984**
36,000-m-tpy, 185-in.-trim, 5000-fpm KMW—tissue

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P&P's exclusive survey of capital spending programs for 1981-83 by companies and at individual mill locations in U.S. and Canada is available as a separate booklet (and is not published in the magazine).

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Projects listed are those planned for 1982 and 1983 (and beyond to 1986, where available), with a recap of programs completed in 1981.

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Battle lines shaping up in coming war between paper, electronic media

Printing and writing mill executives are beginning to get a fix on the threat to uncoated free sheet, newsprint, as well as uncoated groundwood paper

By DAVID R. ALLAN, News Editor

☐ Every printing and writing paper mill in North America will feel the chilly breath of the electronic media on its neck by the end of this century. Computer terminals in the office and home, tied in to central computers that can provide information and store, as well as transmit messages, could make some uses for paper nearly obsolete within the next 20 to 30 years.

For some companies, that will mean an eventual, permanent end to healthy sales-growth rates. For others, it may present opportunities to capture market share in areas of the paper industry that stand to substantially benefit from the electronic revolution in communications.

Finding the best course to follow in the coming years, in order to meet the challenge of the electronic media, has already become nearly a full-time job for some paper industry planning and marketing executives. One consulting company estimated that the number of seminars held on the "electronic office" in the U.S. has risen from about 20 in 1978 to an estimated 200 this year. And still no credible projections have been developed that can trace which grades of paper will be hurt by electronic competition, which will be helped, and by how much.

However, some paper company executives have begun to have some pretty solid theories on where the biggest danger areas lie and where the greatest potential opportunities may be found.

Newsprint

The paper grade who's vulnerability has gotten the most public scrutiny in the last few years is newsprint. Newsprint may bear the brunt of experimentation with consumer information distribution systems, with newspaper chains such as Knight-Ridder, broadcast networks such as CBS, and even American Telephone & Telegraph testing ways to deliver news and information in alpha numeric form to home screens. One executive cited a recent American Paper Institute study that counted 83 home video information systems in operation around the

Table 1. Major grades of paper that may be affected by electronic competition: U.S. production
(000 short tons)

	1970	1975	1980	1985e
Newsprint[1]	12,200	11,400	14,400	16,500
Groundwood specialties				
Roto news[2]	270	225	250	315
Directory[3]	200	300	450	575
Catalog[3]	250	300	390	450
Groundwood forms	n.a.	75	230	360
Book paper	155	130	130	130
Uncoated free sheet				
Forms bond	720	950	1500	1900
Envelope stock	190	160	225	250
Offset book	1400	1450	2000	2400
Bond and writing	700	1000	1800	2300
Tablet	350	230	325	300
Coated paper				
Nos. 1 to 4, two-side	950	1200	1800	2200
No. 5, two-side	1950	1650	2400	3100

n.a. = not applicable
[1]North American production
[2]Estimated U.S. consumption: 1980—700,000 tons; 1985—900,000 tons. Estimates for 1970 and 1975 not considered reliable.
[3]Numbers reflect estimated U.S. consumption, not production. Estimates for production not considered reliable.

Source: PULP & PAPER estimates.

◀**Computer control room** coordinates Mead Corp.'s Lexis and Nexis electronic data services.

world, ranging from Britain's one-way (noninteractive) Ceefax system, with an estimated 105,000 subscribers, to others, in some cases with 100 or fewer subscribers.

Some analysts, among them the Norwalk, Conn.-based consulting firm International Resources Development, believe newsprint consumption in the U.S. will begin to level out in the late 1980s, while one newsprint executive cited another consultant's study that showed newsprint demand levelling about 1990 and starting to fall around 1995. This executive said he doubts it will do more than level off in this century if AT&T's role in developing home video information services is severely limited by law—and will still take five to eight years to level off even if AT&T doesn't suffer from major legal limits—a sentiment often expressed by industry officials.

Book-size screens

A major problem for home news services is many consumers' reluctance to spend great lengths of time reading a bright, nonportable screen. But recent press accounts indicate Britain's Sinclair Research, along with Japan's Hitachi, Matsushita, and Toshiba, have all developed book-sized televisions with liquid crystal screens, solving portability and brightness problems—and for prices reportedly below $200/set.

But other problems may prove more difficult for the home news services to overcome. Mead Data Central's Bob O'Hara, himself a marketer of electronic information services, noted that among the decisions to be made by those trying to sell electronic information to the home, is the basic one of the delivery mechanism—"is it going to be roof antennas that will sell for $300 or $400? Is it going to be cable television? Is it going to be AT&T replacing twisted copper with fiber optics?"

Until some standardization appears in delivery mechanism—with decisions to be made requiring millions of dollars, or more, in capital investment—many believe home services will remain experimental. And the U.S. still has not adopted a technical standard for one-way or "teletext" broadcasts, also a requirement before teletext can benefit from economies of scale.

Legal obstacles

Another possible obstacle is the persistent resistence of newspaper publishers to AT&T attempts to bring "electronic Yellow Pages" services into the home. Legislation is now being considered that would restrict the phone company's role to offer any directory information electronically to that of a common carrier, rather than a generator of videotext (two-way or "interactive") information, suggesting that AT&T may ultimately opt for joint ventures, with local newspapers providing classified advertising and AT&T providing business directory information with no advertising content.

The degree of electronic delivery systems' penetration into classified advertising will determine whether or not the new media flatten newsprint demand, for a big loss of classified advertising could be the difference between growth and a static condition for many newspapers.

But no matter what form—if any—taken by electronic Yellow Pages or classifieds, it remains to be seen if consumers will pay to get more prompt and varied information services than they now enjoy. "Living at home in Connecticut, do I need to get the Brussels-to-Paris train schedule on my television screen? And if I need to know the time of the next train to Grand Central, I'll call Conrail; I don't need to pay to get it on my screen," one skeptical paper industry marketing man said.

Slower ad-growth rate

AT&T itself is thought to believe 7% of all U.S. homes will have videotext by 1990, while San Jose, Calif.-based Strategic Inc. predicts videotext penetration will be more than six times as great as the AT&T forecast, one executive noted.

Even more modest predictions indicate a possible slowing of newspaper advertising growth rates by 1990, however. At least one expert, McCann-Erickson Canada's Robert Troutbeck, believes that home videotext systems will carry about 3% of all Canada's advertising—in terms of revenue—by 1990, with terminals in 2% to 3% of Canadian homes. Classified advertising and direct mail will be the major categories, he estimates, with some impact on catalogues and point-of-sale advertising. If that estimate applies to the U.S. also, newsprint executives contemplating capacity changes in the 1990s—if not before—will have to consider whether they should be adding to capacity, or just replacing existing machines.

Uncoated groundwood

Still, in the home, uncoated groundwood may be affected as much as newsprint. Once again, AT&T's plans for electronic directories would affect uncoated groundwood mills, depriving the market of its biggest customer and one that, by itself, consumes about 80% of all North American directory paper production.

If other phone companies were to follow the lead of Ma Bell—and if the Official Airline Guide and other directories that are looking at electronic presentations do

the same—then directory paper would virtually disappear from the North American market. And as Fraser Paper's Dan Temple noted, "AT&T is the one company that has the financial muscle to make the kind of investment that is necessary to provide full videotext capabilities."

Mills that want to export their directory paper would have a hard time finding markets, since the French government is proceeding with plans to replace all phone books with electronic directory hookups by 1995. Even if that timetable is replaced by a more reasonable one that would give the French a few more years to accomplish the gargantuan task, their experiment can be expected to be imitated by other European countries as well, rendering surplus most of Europe's directory paper capacity. Thus Europe wouldn't be a potential market for North American mills, and European mills would be competing hard for the world's remaining directory markets.

Videodisk catalogues

Catalogue paper may also be hurt by the electronic revolution. Sears Roebuck is already experimenting with video catalogues in its stores, and observers see no reason why all catalogue stores couldn't one day replace paper with video display terminals. And once a large number of American homes have terminals, catalogues could be electronically routed to videotext subscribers. Videodisk players could also replace paper catalogues if they ever reach wide penetration of the home market, since they offer the capability to freeze frames and move around the disk's memory at will.

All this comes at a time when old newsprint machines are slowly being converted to uncoated groundwood production (one U.S. newsprint executive predicted 1 million tpy of Eastern Canadian capacity would make that shift within five years) and new groundwood machines are being proposed. Among them is a 210,000 tpy machine being considered by ISA International, a subsidiary of Germany's Haindl Group, for a proposed mill in Alabama.

But the news for groundwood mills may not all be bad. Abitibi-Price and others are working hard to develop groundwood sheets that will run well through fast nonimpact printers, and consider such a product to be essential to their involvement in the growing groundwood computer paper market. In a day when small office computers are becoming cheaper and their printers faster, groundwood computer paper may prove to be the most durable segment of the groundwood market.

Coated paper

Coated paper is another grade that may be affected by the electronic revolution and also finds its way most commonly into the home. One estimate has the coated groundwood demand growth rate halving in ten years, from 4%/year in the 1980s to 2%/year in the 1990s, partly as a result of tonnage being preempted by feature articles and advertising going over to home news services. Serious impact on magazine readership probably depends on widespread use of videodisks or development of a portable flat display screen with less brightness than the typical VDT. Mill executives also comment that the penetration of videotext into the home environment may hurt use of coated free sheet for direct mail, which has served as a strength of the coated paper market in recent years.

Uncoated free sheet

The other big grade that could be affected is the family of uncoated free sheet. Major categories of uncoated free sheet that may be affected by new electronic information transmission markets and developments in data base management include offset, bond, tablet, xerographic, forms bond, and even envelope stock. Indeed, uncoated free sheet represents the front line in the battle between the paper industry and the much-ballyhooed—and overblown—"paperless office."

One estimate sees the number of high-speed intelligent printers installed in the U.S. shooting up by 266% between 1980 and 1985, to nearly 6800 units. These and many of the smaller, cheaper office computer/printer sets that are becoming common in business have the capacity to tailor-make forms without dependence on business forms paper, and often have image quality and graphics generation capability to rival offset printers. In the long run, this trend could seriously threaten the demand for forms bond and offset paper, executives warn.

Indeed, a revolution in office information management is taking place—what Lloyd Chambers of Great Northern Nekoosa called the "digitization of text." For paper consumption, this means that more and more information can and will be stored in computers rather than in paper files—with all that implies for use of bond, tablet paper, reprographic paper, forms bond, and offset paper. Many kinds of paper may be affected by the current round of experiments in electronic home banking services services, for example, with Bank of America and First Interstate Bank, two of the leaders in that field.

Bank data bases

Electronic funds transfer could eventually flatten growth of checkbook production also. And banks themselves are leaders in internal use of electronic filing, electronic forms, and electronic memos. Continental Bank, with 600 data bases in-house, is pushing hard to bring electronics into the office, and is said to expect to cut its internal paper use as early as 1982.

Many business forms are susceptible to the conversion to electronic transmission and storage. One executive cited an International Business Forms Industries estimate that 62% of all forms are used for internal documentation, and only 36% are used for sales documents. This executive estimates a large portion of that 62% may eventually move from forms bond to electronic storage—or at least may be printed on groundwood forms rather than free sheet forms bond.

If cheap, flat, portable display terminals become commonplace, consumption of book paper could suffer, with reference books the first to go, one marketing manager worried. Technical and special interest books represent 8% of the U.S. book publishing market, he added. He also noted an estimate in the API study that a single videodisk can hold as many images as are contained in the entire *Encyclopedia Brittanica*, pointing out the threat of videodisks to reference books.

Voice mail and computerized store-and-forward memo services may hurt demand for bond and envelope, observers believe, with one estimating that nearly 350 of

the Fortune 500 companies will have electronic mail or message services of some kind—however primitive—within a year. He added that the current ratio in U.S. business of one terminal for every 20 desks is expected to increase to one terminal for every three desks by the year 1990.

Bills in envelopes

Another executive, however, pointed to a Univ. of Michigan study that indicates 59% of all first-class mail is involved with billing and payment, most of that moving from business to the home, and may be less susceptible to conversion to electronic form. The largest electronic mail system being planned, that of the U.S. Postal Service, will still depend on paper for hard copy at the receiving end.

Reprographic paper may be hurt by the development of cheap office copiers with duplexing capability—the ability to print on both sides in an effort to save paper. But xerographic may also benefit from technical innovation, as ever-cheaper copiers continue the current trend toward heavy utilization of the copy machine in the typical office. □

Mead's view: If you can't beat 'em, join'em

Confronted with the ugly prospect of paperless offices, paperless homes, and even paperless briefcases by the end of the century, paper companies have adopted every strategy from cautious watchfullness to burying their heads in the sand. One firm, however, has chosen to attack the problem head-on—by becoming, itself, a major force in the electronic revolution.

Mead Corp. doesn't take seriously a lot of the "paperless office" predictions, and it still expects to be running paper mills beyond the turn of the century. But it also wants to avoid becoming the victim of an expected flattening in consumption growth rates for many grades of paper.

Steering clear for now from the competitive Armageddon shaping up in the home information market—with corporate giants like AT&T and CBS planning to throw millions at the still unsuspecting consumer—Mead and its Mead Data Central unit decided first to build up expertise in electronic data-base management by serving a clearly defined category of users with specific information needs.

First, the firm launched Lexis, a legal data referencing service, and then more recently followed up with Nexis, offering the subscriber access to news articles. Less than a decade after launching Lexis, the service counts among its subscribers more than 1000 law firms, law schools, government agencies, and corporate legal departments—including among them Boise Cascade Corp.'s legal unit, according to Boise Cascade. The two services gross "between $40 million and $75 million/year," according to Robert M. O'Hara, senior vice president of Mead's Advanced Systems Group and father figure for ASG's major project, MDC; and Nexis is "growing faster than Lexis did at the same stage."

But more important than short-run profit, Lexis and Nexis have taught Mead a lot about selling electronic information, and have helped the company to sharpen its long-term product development strategy.

Industry data bases. O'Hara listed several potential directions for MDC to go in its exploration of data-base management, beginning with the Lexis/Nexis path—vending professional and industry data bases to a relatively small number of interested clients. Under the present system, subscribers rent a terminal and telephone hookup, which allows them to communicate directly with a central computer in Mead's Dayton, Ohio, headquarters. They have access to information that has been cranked into the central computer by a variety of methods, ranging from magnetic tape from news services, publishing companies, and law courts, to laser scanning in some cases—and keypunching at MDC central terminals by MDC workers, as a last resort.

Mead is considering further expansion in professional data bases, including financial information, patent law search, and chemical research capabilities; it is also looking into selling data bases for whole industries, with petroleum, banking, and paper among the possible choices. It is also keeping an eye on possible entry into the European market.

Electronic newsletters. Tying its Nexis experience at dealing with publications together with its interest in industry and professional data bases, O'Hara mentioned that "there may even one day be specialized industry or professional newsletters that could be distributed only electronically," using the MDC system.

Industry and professional data bases represent a relatively safe investment for an information company that has begun to accumulate considerable experience in this kind of service. By its nature, however, this kind of data-base service is expensive to set up and limits the vendor in its range of clients.

Electronic office files. Potentially much broader in scope is another possible project which O'Hara considers to be a "very viable option"—electronic office files, in which subscriber companies could begin to store the great mass of their office files on the MDC system. At that time, "when we get into broad-base private office files I think we'll have to do it through multipurpose terminals," O'Hara notes, with the Mead central computer being capable of communicating with whatever terminal the subscriber has in his office.

Under such a service, if an executive with a subscriber company wanted background information on a particular subject to help him write a speech, he might make use of Nexis. Then, if he wanted to send a memo to the chairman of the company summarizing his speech, he could store his personal file copy of the memo in an MDC computer, "under a code that allows only him to have access to the file" O'Hara explained. Finally, the executive could even send the memo electronically to his boss—without the message ever seeing a piece of paper.

O'Hara won't rule out the possibility that when that executive goes home after a hard day at the terminal, he will sit down in front of a Mead terminal in his den when he wants to figure out his personal finances—or read his boss' instantaneous reply to that electronic memo.

U.S. crude tall oil production

International Naval Stores meeting focuses on CTO production, outlook for fractionation capacity in U.S., Canada, and Scandinavia

By KEN SMITH, Senior Editor

☐ Crude tall oil (CTO) production in the U.S. is expected to reach a record 937,000 tons in 1981 when final tabulations are completed. This estimate is based on the assumption that production in the latter half of the year will continue at the same pace set in the first six months. However, according to **E.E. McSweeney**, pres., Marcam Inc., with greater use of sawmill residues, increased cutting of younger trees, and higher hardwood utilization for sulfate pulping, CTO production will probably increase only 1% to 2%/year through 1985. Addressing approximately 350 attendees from 22 countries at the Eighth International Naval Stores meeting in New Orleans, La., McSweeney reported that average CTO production has increased from 3.3% (by weight) of total pulp production in 1975 to nearly 4.0% in 1980 due to improved recovery practices and a general increase in Southern pine-based sulfate pulping capacity.

Table 1. **Trends in U.S. pulp capacity**
(000 metric tons)

Year	Total all grades	Sulfate		Sulfate % of total
1950	13,622	BPG	2381	54.7%
		UPG	5069	
		Diss.	0	
1960	25,646	BPG	6559	61.1%
		UPG	8863	
		Diss.	247 e	
1970	39,538	BPG	12,875	72.8%
		UPG	15,281	
		Diss.	637 e	
1980	48,536	BPG	17,755	75.6%
		UPG	18,280	
		Diss.	627	

BPG = Bleached paper grades
UPG = Unbleached paper grades
Diss. = Dissolving and special alpha grades
e = estimated

In a session chaired by **Robert G. Carter** of Monsanto, reports were also given on the naval stores industry in Scandinavia and Canada, and on recent developments in the pulp and paper industry as they affect naval stores production. Attendance at the conference, which was followed by a two-day technical symposium, was the largest ever.

U.S. rosin production

McSWEENEY

According to McSweeney, tall oil recovery in the U.S. can be significantly improved. He estimates that CTO yield based on pulp should be as much as 6.6% vs the 4.0% currently recovered. He pointed to the fact that CTO yield from available black liquor soap averages only 51%, considerably less than the theoretical recovery rate.

The percentage of CTO distilled in the U.S. vs total CTO production has remained at about 88% since 1973. CTO exports are likely to increase in the future, but those increases will probably be offset by modest projected increases in domestic production. As would be expected from the record CTO production for the first half of 1981, a record amount of CTO was distilled during that period. Total distillation is expected to reach 770,000 tons for the year, as compared to the previous high of 762,000 in 1979.

Tall oil rosin (TOR) production averaged 30.4% of the total crude distilled from 1970 to 1979. However, TOR production slumped to only 27.7% in 1980. According to McSweeney, it is uncertain whether this decrease reflects a change in distillation practices or an accounting anomaly.

Rosin production from all sources (gum, wood, and TOR) in the U.S. was 345,000 tons in 1980. Rosin production is expected to increase slightly to 366,000 tpy by 1985. McSweeney predicted that gum rosin production will level out at 5000 tpy and that wood rosin production, with a boost from the Hercules Pinex process, will stabilize at 115,000 tpy. TOR yield should average 31% of the CTO production.

TOR consumption in the U.S. has been decreasing steadily since 1970, especially as used in the manufacture of paper and rubber. Papermakers have shifted from

may reach record level in 1981

paste size to emulsion size, and the trend is likely to continue. Rubber use is declining as automobile tires become smaller and give longer mileage.

In the other major use for rosin, printing inks and adhesives, there is a slight upward trend in consumption. Pressure-sensitive adhesives, which employ rosin-based or hydrocarbon resin tackifiers, are growing in output by at least 6%/year. Printing inks continue to be a major and growing outlet for variously modified rosin esters and resinates. The high cost of hydrocarbon derivatives has helped the competitive position of rosin in this market. However, McSweeney said that the naval stores industry must continue to improve its products to maintain its market share.

Paper industry developments

SLINN

Ron Slinn, vice president of the American Paper Institute, spoke on paper industry trends that affect naval stores production. Slinn noted the huge increase in sulfate pulping capacity which has occurred since 1950. Over the past 30 years, sulfate pulping has grown by an annual rate of 5.5%, and now accounts for more than 75% of all U.S. capacity.

Thermomechanical pulping has recently been a rapidly growing segment of the industry. Slinn predicted that between 1980 and 1983, TMP capacity will grow 60% to become almost 4% of the total U.S. pulping capacity. The significance of TMP growth to the naval stores industry is that the process does not recover spent chemicals; no byproducts are produced.

Slinn noted that in 1980, about 76% of total U.S. sulfate paper-grade pulp capacity was in the South and that 77% of total U.S. sulfate capacity was based on softwoods (with CTO produced). That capacity is expected to increase 6.3%/year to 1983, but regional distribution and grade structure are not expected to change.

The speaker emhasized that while the pulp and paper industry is first among U.S. manufacturing industries in oil consumption, third in coal consumption and electrical purchases, and sixth in natural gas use, it is currently 50% self-sufficient in energy. The industry has reduced its consumption of fossil fuels and purchased energy/ton of product by 29.3% since 1972. Fuel oil consumption has been reduced by 25%, while overall pulp output increased 11% during the same period. Thus, the industry's energy picture gives it a high level of security against either major escalations in conventional energy prices or severe curtailments of fossil fuel supplies.

Slinn stated that paper consumption in the U.S. traditionally follows the GNP. He foresees that the current economic doldrums will impact the industry most significantly in areas closely related to wood products operations. With reduced lumber and sawlogs demand, the supply of byproduct chips for papermaking is likely to

Table 2. **U.S. rosin production**
(short tons x 1000)

Year	Gum[1]	Wood[1]	Tall oil rosin[2]	Total
1970	23.4	201.7	207.8	432.9
1971	22.6	194.6	213.8	431.0
1972	23.7	184.1	222.1	429.9
1973	20.3	174.1	222.7	417.1
1974	14.6	157.7	198.5	370.8
1975	17.9	85.6	161.0	264.5
1976	16.9	132 0	202.2	351.1
1977	13.5	125.5	202.8	341.8
1978	9.4	120.1	212.0	341.5
1979	7.0	116.0	232.1	355.1
1980	5.9	115.0[3]	208.8	329.7

1. USDA
2. Pulp Chemicals Assn.
3. Estimated.

Table 3. **Crude tall oil prices in $U.S. for same end product value**

Year	Scandinavia (1.08 ton of CTO acid number 145)	U.S. (1.00 ton of CTO acid number 160)
1973	103	100
1974	135	100
1975	187	255
1976	157	137
1977	161	143
1978	182	165
1979	214	170
1980	245	170

1. Average Swedish export price
2. Average according to *Chemical Marketing Reporter*

decrease. High interest rates, and reduced cash flows and profitabilty, have forced many companies to postpone capital spending programs, including capacity additions.

Slinn concluded by saying that the industry faces increased challenges from electronics and plastics, which could lead to decreased demand. However, the overall outlook, especially for exports, is good.

Scandinavian naval stores

KOLOSH

Frans Kolosh, group vice president of Stora Kopparberg, reported that CTO production in Scandinavia has reached a peak of about 280,000 tpy, which is sufficient to meet only about 80% of the present fractionation capacity in Europe. He noted that the quality of CTO produced in Scandinavia is generally lower than that from the Southern U.S. (average acid number of 145 vs 160 in the South). Due mainly to increased fuel costs, CTO costs to fractionators for the same end-product value are about 30% higher ($252/ton vs $190/ton) in Scandinavia.

Kolosh stated that approximately 40,000 tpy of CTO contaminated with birch is produced annually in Scandinavia. This "birch oil" has an acid number of 120 or less and a rosin content of about 20%, making it uneconomical for fractionation. At present, most of this oil is burned for fuel in the pulp mills.

Kolosh said he believes that the European naval stores industry can improve its competitiveness by developing a differentiated and broad range of tall oil fatty acids (TOFA) and TOR product specialties and/or derivatives which considerably increase the added value of the available CTO. Attempts in this direction are exemplified by high-purity TOR, and TOFA with improved color characteristics recently developed by European fractionators.

Due to genetic differences, polyunsaturated fatty acid contents in Scandinavian TOFA is higher than southern U.S. TOFA. Such differences could be used to develop more competitive European TOFA qualities for special uses, such as highly conjugated fatty acids. Finally, Kolosh believes technology can be developed to process significant volumes of birch oil into valuable byproducts. He also called for a joint effort among naval stores producers to develop the technology necessary to recover pitch, which is a byproduct of CTO fractionation that is currently burned.

Canadian naval stores outlook

NORMAN

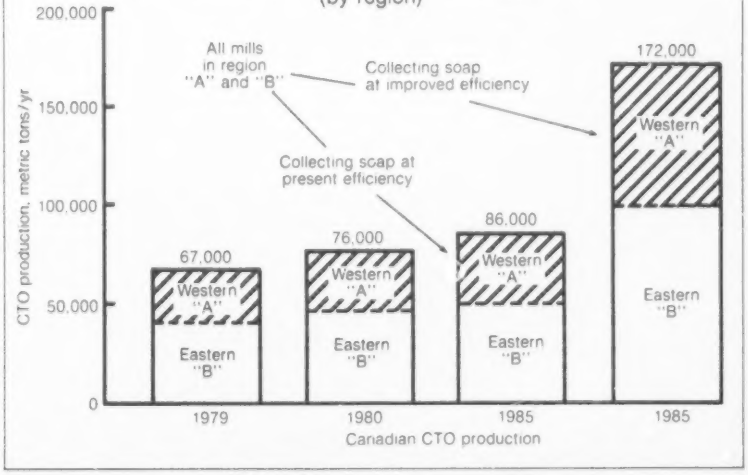
According to **Hugh Norman**, vice president and general manager, B.C. Chemicals Ltd., his company is the largest CTO producer in Canada with a production rate of 15,500 tons in 1980. Total CTO production in Canada was 84,000 tons in 1980. Norman noted that, of 21 Canadian pulp mills with soap-collection potential, only 16 are collecting it, and only 7 of the mills operate plants to produce CTO. CTO recovery at those mills averaged 44 lb/a.d. ton of pulp production at mills in eastern Canada, and 35 lb/a.d. ton at western Canadian mills.

Norman estimated that, if all mills were to collect soap, by 1985 CTO production would rise to 96,000 tpy at present recovery efficiencies (about 40%). If all mills improved recovery to 80%, production could reach 191,000 tpy. Thus, Canada remains the largest untapped source of CTO in the western world.

The quality of Canadian tall oil is generally highest in the East with an average acid number of 142, and is slightly lower in the West with an average acid number of 136. The difference is due to the varying species being pulped and increased use of saw...ill chips in the West. Average rosin and fatty acid contents of Eastern tall oil are nearly equal, while fatty acid content of Western tall oil is about 13% greater than the average rosin content.

Canada is a net exporter of CTO because overall production exceeds (by about 60,000 tpy) its fractionation capacity. The U.S. is its largest export consumer, having bought 42,000 tons of CTO, 31,000 tons of soap in 1980.□

Figure 1. **Projected Canadian CTO production** (by region)



Titanium dioxide available, prices rise substantially

By BARRY SHOCKETT

The overall titanium dioxide (TiO_2) market has held up surprisingly well, and production in 1981 should slightly exceed the 1980 level. The paper industry has remained a good growth area for TiO_2, and usage rose 6% in 1981; it should increase 5% in 1982. The overall market has not reached the level hoped for since the depressed U.S. economy has affected the major end-user, the paint industry. The paint industry is closely tied to the automotive and housing industries, and both of these markets were depressed in 1981. In addition, paint manufacturers are facing increased competition in residential housing markets by other wall coverings such as paper and paneling. Imports jumped up in 1981 to about 128,000 tons, reversing a downward trend since 1978.

The Canadian economy was in no better shape last year than that of the U.S., and paint industry TiO_2 usage was down. However, consumption in 1981 by paper mills was also down, primarily due to lost printing/writing paper tonnage caused by the labor problems in eastern Canada, which began in late 1980 and continued until the second quarter of 1981.

U.S. statistics for titanium dioxide (000 short tons)

	1978	1979	1980	1981e
Capacity	1000	1000	1000	1000
Production	701	741	714	725
Imports	118	105	98	128
Exports	38	49	42	60
Apparent U.S. consumption	781	797	770	793

Source: Bureau of Census, U.S. Dept. of Commerce, and P&P estimates

Canadian statistics for titanium dioxide (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	79.4	79.4	79.4	79.4
Production	76	75.5	77.6	78.3
Exports	17.1	17.1	14.3	14.3
Imports	7.7	12.7	8.4	6
Apparent consumption	66.6	71.1	71.7	70

TITANIUM DIOXIDE

UNITED STATES

Uses: Titanium dioxide pigment is used by the paper industry in printing/writing papers and paperboard mills as a filler and coating pigment. Both rutile and anatase grades are used, with the majority comprised of anatase. The largest end-use is paints; others include plastics, rubber, and ceramics.

Demand: Production through the first three quarters of 1981 was ahead of the 1980 level, and total 1981 production is estimated at 725,000 tons. With imports up 30% over 1980, apparent U.S. consumption will be an estimated 793,000 tons, up about 3% over 1980. Paper industry usage was up about 6% in 1981, primarily as a result of a strong performance by the coated paper sector.

Sources: U.S. producers, in decreasing order of capacity are: DuPont, SCM Glidden, American Cyanamid, Gulf + Western, NL Chemicals, and Kerr-McGee.

Availability: TiO_2 is readily available, and operating rates have been running between 70% and 72% for the past three years. 1980, market; 1979, anatase, market; rutile, tight.

Pricing: List prices for anatase and rutile grades rose 6¢ and 7¢/lb respectively in August 1981 (the second increase in 1981), bringing the published delivered prices to 69.5¢ to 70¢/lb for anatase and 75¢ to 76¢/lb for rutile. The previous boost at the beginning of 1981 was of the same magnitude. Pricing history: 1980, anatase, 57¢/lb; 1979, anatase, 53¢/lb; 1978, anatase, 46¢/lb.

Forecast: If automotive and housing markets improve in 1982, total usage should grow 2% to 3%. Plastics appear to be a strong growth area, if end-use applications continue to grow, which will depend on the overall economy.

CANADA

Uses: Fine paper mills account for about 90% of the anatase TiO_2 used, with paperboard mills consuming the balance. The largest consumer is the paint industry, followed by plastics and rubber applications.

Demand: Canadian apparent consumption was down slightly in 1981 at 70,000 short tons. This was due to weak paint and paper markets. Paper industry usage was 6600 tons (9.4%) down from the 7200 tons (10%) in 1980. Plastics and rubber applications increased their share to about 32.2%. Imports in 1981 were down 28.6% from 1980 levels, while 14,300 tons were exported, the same amount as in 1980.

Sources: There are two domestic producers, NL Chem Canada and Tioxide Canada. Imports are mainly from the U.S., although some are from Europe.

Availability: Although TiO_2 producers have been operating their plants close to capacity, any substantial increase in domestic demand could be satisfied by reducing exports. 1981, untreated anatase, market; 1980, market.

Pricing: There have been no price changes since July 1981 when dry untreated anatase rose 5.5¢/lb to 74.5¢/lb, bags, delivered. Slurry shipments are an additional 0.5¢/lb. Pricing history: 1980, 59¢ to 69¢/lb; 1979, 48.5¢ to 59¢/lb.

Forecast: Total titanium dioxide usage is expected to resume its 2% to 3%/year growth in 1982, if construction and automotive markets improve. Paper industry usage should grow at close to 10%/year, and plastics consumption through 1985 should increase almost 12%/year.

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